MINES SAFETY WEEK OBSERVANCE- 2018

HYDERABAD REGION

Welcomes You

To

34th MINES SAFETY WEEK OBSERVANCE - 2018

HOST

ADITYA BIRLA

UltraTech

UltraTech Cement Limited

Unit : Balaji Cement Works

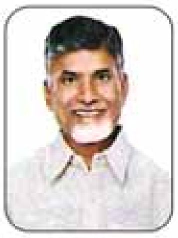
Budawada-Village, Jaggaiahpet-Mandal,
Krishna-District, Andhra Pradesh.

*Organising Committee extends thanks to
All the Authors, Participants, Advisers, Advertisers
for their active co-operation.*

Messages

NARA CHANDRABABU NAIDU **AMARAVATI**

CHIEF MINISTER
ANDHRA PRADESH



MESSAGE

I am glad to know that the Mines Safety & Productivity Council, Hyderabad Region is celebrating Mines Safety Week-2018 during Nov-2018 under the aegis of Directorate General of Mines Safety, being hosted by M/s. UltraTech Cement Limited, Balaji Cement Works, Budawada.

It is necessary for all the stakeholders, mine owners, mine managers and workforce in the field of mining to adopt the new technologies to make mining activities more Scientific, Efficient, Competitive, Cost-effective, Eco-friendly and above all Safe. As safety aspects concern human lives, they should always receive due consideration.

It is heartening that the Mines Safety & Productivity Council is making effort to inculcate safety awareness among mining fraternity.

I hope that during the Mines Safety Week, all relevant Safety issues and ways & means by which mining activities are made sustainable and in conformity with Laws will not be addressed, but solutions will be found to confer economic benefits to society at large.

I convey my good wishes for the success of the Mines Safety Week Celebrations-2018 to the organisers.

(NARA CHANDRABABU NAIDU)

R.V. SUJAY KRISHNA RANGA RAO
Minister for Mines & Geology
Government of Andhra Pradesh

Room No. -203, 3rd Block,
I[st] Floor, A.P. Secretariat,
Velagapudi, AMARAVATHI.
Office : 0863-2443764
Fax : 0863-2443738
Email : min-mines@ap.gov.in

MESSAGE

I am extremely delighted to know that the Mines Safety & Productivity Council, Hyderabad Region is organising Mines Safety Week-2018 under the aegis of Directorate General of Mines Safety, being hosted by M/s UltraTech Cement Limited, Balaji Cement Works, Budawada.

Observance of "Mines Safety Week" is aimed at enhancing the Safety awareness among workers, supervisors and officers. It is also an occasion to demonstrate the best practices in the field of Safety. With rapid changing scenario, companies should adopt Latest technology and manage the inherent risk & hazards scientifically. Safety should be a prime consideration factor for all activities. It is important that spirit of safety is also perpetuated among all, thus contributing to achieve the noble cause of "Zero Incident" in Mines.

I extend my best wishes for the success of Safety week celebrations and hope for safe and productive working of mines.

(R.V SUJAY KRISHNA RANGA RAO)

भारत सरकार
GOVERNMENT OF INDIA
श्रम एवं रोजगार मंत्रालय, MINISTRY OF LABOUR & EMPLOYMENT
खान सुरक्षा महानिदेशालय
DIRECTORATE GENERAL OF MINES SAFETY

सत्यमेव जयते

Tel. +91-326-2221000
Fax +91-326-2221027

Prasanta Kumar Sarkar
Director-General

MESSAGE

It is my pleasure to know that M/s Ultratech Cements Ltd, Jaggayapeta is celebrating State Level Mines Safety Week during December, 2018. I am happy to note that a Souvenir would be released to commemorate the occasion.

I believe that Safety Week observed in the right spirit will result in improved health and safety awareness leading to improved quality of life and ultimately improved productivity These programmes are useful and effective tools of education, providing opportunities for learning from each other's which also provide a forum for review and interaction on safety consciousness by experts from various fields from different organizations.

I extend my good wishes for the success of the Annual Mines Safety celebrations and for safe and productive working of the mines.

(Prasanta Kumar Sarkar)

राष्ट्र की सेवा में 100 वर्ष
A CENTURY COMMITTED TO THE SERVICE OF THE NATION

भारत सरकार /Government of India
श्रम और रोजगार मंत्रालय
Ministry of Labour & Employment
खान सुरक्षा महानिदेशालय
Directorate General of Mines Safety
दक्षिण मध्य अंचल
South Central Zone, Hyderabad

सत्यमेव जयते

Phone: 040-27532502
Fax : 040-27532504
E-Mail: ddgscz@gmail.com

Directorate-General of Mines Safety,
South Central Zone,
No.704, C.G.O. Towers, Kavadiguda,
Secunderabad – 500 080.
Phone : 040-2753
Fax : 040-27532504

Vidyapathi
Dy.Director-General

MESSAGE

It gives me immense pleasure to know that Mines Safety and Productivity Council, 2018 (Hyderabad Region) would be celebrating Mines Safety Week during December 2018 and that a Souvenir would be published on the occasion.

My appreciation for all those work persons, who worked hard in extraction of minerals from the bowels of Mother Earth. Mining was and will remain a very risky and hazarduous profession. Simultaneously, mining industry has always been the backbone of the economic growth of our country. To extract the mineral with countering the risk scientifically, involves deep knowledge of the subject. We continuously strive to achieve that. Continuous adoption of advanced technical methods in extraction of mineral will definitely help the work environment to be free from accidents. Celebration of Safety Week in the Region creates awareness of newer safety methods and techniques.

I sincerely wish the Safety Week Celebrations in the region, a grand success.

20/11/18
(Vidyapathi)

भारत सरकार /Government of India
श्रम और रोजगार मंत्रालय
Ministry of Labour & Employment
खान सुरक्षा महानिदेशालय
Directorate General of Mines Safety
दक्षिण मध्य अंचल
South Central Zone, Hyderabad

सत्यमेव जयते

Phone: 040-27532502
Fax : 040-27532504
E-Mail: ddgscz@gmail.com

M. Narsaiah
Director of Mines Safety

Directorate-General of Mines Safety,
South Central Zone,
No.704, C.G.O. Towers, Kavadiguda,
Secunderabad – 500 080.
Phone : 040-2753
Fax : 040-27532504

MESSAGE

I am very happy to learn that Mines Safety and Productivity Council, Hyderabad Region, is organizing Mines Safety Week Celebrations during December 2018 and that a Souvenir is being published on the occasion.

Mining was always treated as risky and hazarduous operation. However, during the last 2 to 3 decades, mining activity has grown by leaps and bounds and has contributed substantially to the national economy. This has been possible only due to increased mechanization in mining activities. Further, observation of Safety Week will not only bring about improvement in working environment, but also generate a sense of confidence and safety awareness among the mine executives and workmen. I am sure that the spirit generated during the safety week would be sustained throughout the year.

Safety week is one such occasion where emphasis on safety can be passed on to the grass root level to adopt safe work practices and methods to improve safety standards in the mines. I wish the Safety Week celebrations a grand success.

(M. Narsaiah)

भारत सरकार/ Government of India

श्रम एव रोजगार मंत्रालय/Ministry of Labour & Employment

खान सुरक्षा महानिदेशालय/Directorate-General of Mines Safety

हैदराबाद क्षेत्र सं-1/Hyderabad Region No.1

SHYAM MISHRA,
DIRECTOR OF MINES SAFETY,
HYDERABAD REGION NO.I

MESSAGE

It gives me immense pleasure to note that Mines Safety & Productivity Council, Hyderabad Region in association with about 40 captive mines attached to Cement Plants, APMDC, RINL, in Telangana and AP States is organising Annual Mines Safety Week Observations from 26-11-2018 to 01-12-2018 and Final Day Function on 9th December, 2018 hosted by M/s. Ultratech Cements Ltd., Jaggaiahpet under the aegis of Directorate-General of Mines Safety, Hyderabad.

The main aim of Safety Week Observation is to inculcate safety consciousness among all connected with mining activities right from the person working at lowest level to highest managerial staff and owners.

The main objective is to provide facilities to all mine workers to improve their occupational health and safety standards.

I am confident that the observations of Mines Safety Week would achieve the desired objective which in turn helps to achieve the goal of ZERO HARM in mines.

Happy to note that a Souvenir is being released to commemorate the occasion.

Wish the observations and celebrations a grand success.

(SHYAM MISHRA)
DIRECTOR OF MINES SAFETY,
HYDERABAD REGION NO.I

Mohammed Niyazi
Director of Mines Safety
Hyderabad Region No. 02

सत्यमेव जयते

Govt. of India
Ministry of Labour & Employment
Directorate General of Mines Safety,
South Central Zone,
Hyderabad Reg.02
Room No. 701, C G O Towers,
Kavadiguda,Secunderabad-500080
Tel: 040-27534500(Ext:204),
Fax:040-275325047

MESSAGE

I am delighted to learn that Mines Safety and Productivity Council, Hyderabad will be observing Annual Safety Week from 26.11.2018 to 01.12.2018 in the captive Lime stone mines of Cement Industries covered under the jurisdiction of Hyderabad Region No. 1 & 2 offices of the DGMS, SCZ, situated in both Telangana and Andhra Pradesh States and also bringing out a souvenir to commemorate the occasion during final day function scheduled to be held by M/s Ultratech Cements Ltd; on 09.12.2018.

Mining Industry in India is growing at a fast pace with the increased level of mechanization. The occupational health, safety and welfare of persons employed in and around mines is utmost importance for the growth of the industry. Observance of Mines Safety Week provides an opportunity to inculcate safety consciousness among mine workers, supervisors and officials.

I convey my best wishes for all the stake holders of the participating mines in this Safety Week Observance.

(Md. Niyazi)
Director of Mines Safety
Hyderabad Region No.02.

Government of India
भारत सरकार
Ministry of Labour and Employment
श्रम एवं रोजगार मंत्रालय
Directorate General of Mines Safety
खान सुरक्षा महानिदेशालय

K.Vijayakumar
Director of Mines Safety (Mech)
SCZ, Hyderabad

Message

I am delighted to know that the Mines Safety and Productive Council, Hyderabad Region under the aegis of Directorate General of Mines Safety, SCZ, Hyderabad is celebrating Annual Safety Week Observation from 26/11/2018 to 01/12/2018 and final day function on December 9th,2018 hosted by M/s U'ltra Tech Cements Ltd, Jaggaiahpet.

With huge limestone reserves in India has succeeded in developing a cement industry that occupies the second position in terms of cement production in the world. The demand for minerals is continuing to rise year after year as Indian economy grows at a steady rate.

The mineral industry is facing a number of challenges needing innovative technology to overcome the problems and there should be a mechanism for continuous evaluation and upgradation of technology to meet the standards of sustainable and safe mining practices.

Concern about employees safety should engage attention at the highest corporate level. Safety and employees health should not only be a part of a company's mission but also core elements of its business plan, inseparable from productivity and profitability goals.

I sincerely congratulate the Organizers for their initiative taken and wish grand success.

(K.Vijayakumar)

भारत सरकार
GOVERNMENT OF INDIA
श्रम एवं रोजगार मंत्रालय
MINISTRY OF LABOUR & EMPLOYMENT
खान सुरक्षा महानिदेशालय
DIRECTORATE GENERAL OF MINES SAFETY
HYDERABAD REGION NO.1
दक्षिण मध्य क्षेत्र, हैदराबाद
SOUTH CENTRAL ZONE, HYDERBAD

MESSAGE

I am happy to note that mines safety week final day celebration is being celebrated in Hyderabad Region on 09.12.2018 under the aegis of Directorate General of Mines Safety and Mines Safety and Productivity Council, Hyderabad Region, 2018

In the growing industrialization, the mining Industry place a significant role to cope up with the increased demand of minerals by increasing the productivity. Systematic and safe mining play is the vital role and deserve utmost importance.

While congratulating the mines safety and productivity council, Hyderabad Region for its endeavor towards safety, I wish the Mines Safety Week Celebrations a grand success.

(S. PUTTARAJU)
Director of Mines Safety (Elec.)
SCZ, Hyderabad.

भारत सरकार/Government of India
श्रम और रोजगार मंत्रालय
Ministry of Labour & Employment
खान सुरक्षा महानिदेशालय
Directorate General of Mines Safety
दक्षिण मध्य अंचल, हैदराबाद
South Central Zone, Hyderabad

Shyam Sunder Soni
Director of Mines Safety
South Central Zone,Hyderabad

MESSAGE

It is a matter of great pleasure that Mines Safety & Productivity Council, Hyderabad region is celebrating, 34th Mines Safety Week Celebrations in Lime Stone, Dolomite and Barytes Mines under Hyderabad Region.

Mining has always been a hazardous profession and Safety of workers engaged in mining operations is of prime concern to all. Celebration of Safety Week plays a very important role in spreading awareness amongst the mine workers and mine officials, thereby enabling them to carry out mining operations in a safe and effective manner.

I am therefore of the firm opinion that this type of celebrations will go a long way in keeping the mines and its environment accident free. With rapid advancement of technology, we have to create, organize and institute, composite work culture including Safety Management Plan(SMP) and improved infrastructure for better safety.

My appreciation to all those individual and those who have contributed in organizing this safety week celebrations.

On the occasion, I convey my best wishes to all and wish the occasion a grand success.

(Shyam Sunder Soni)

B. Sreedhar, I.A.S.,
Secretary to Government

INDUSTRIES & COMMERCE DEPARTMENT
Mines & Geology
Government of Andhra Pradesh

MESSAGE

I am extremely delighted to know that the Mines Safety & Productivity Council, Hyderabad Region is organising Mines Safety Week-2018 under the aegis of Directorate General of Mines Safety, being hosted by M/s. UltraTech Cement Limited, Balaji Cement Works, Budawada.

Observance of "Mines Safety Week" is aimed at enhancing the Safety awareness among workers, supervisors and officers. It is also an occasion to demonstrate the best practices in the field of Safety. With rapid changing scenario, companies should adopt Latest technology and manage the inherent risk & hazards scientifically. Safety should be a prime consideration factor for all activities. It is important that spirit of safety is also perpetuated among all, thus contributing to achieve the noble cause of "**Zero Incident**" in Mines.

I extend my best wishes for the success of Safety week celebrations and hope for safe and productive working of mines.

SIGNATURE

Office : Room No. 101, Ground Floor, Block No.2, A.P. Secretariat, Velagapudi, Amaravati, A.P.-522237
Ph: 0863-2442117, e-mail: secy_mines@ap.gov.in

BRV Susheel Kumar
Director of Mines & Geology,
Government of Telangana

MESSAGE

I am happy to know that the Mines Safety & Productivity Council, Hyderabad Region is celebrating Mines Safety Week 2018 in the November 2018 under the aegis of Directorate General of Mines Safety, and hosted by M/s. UltraTech Cement Limited, Balaji Cement Works, Budawada.

With rapid changing scenario, it is indispensible that all the stakeholders, mine owners, mine managers and workforce in the field of mining adopt new technology to make mining activities more Scientific, Systematic, Efficient, Eco-friendly and above all Safe. Safety aspects concern human lives, they should always receive due consideration and achieve the noble cause of 'Zero Incidence' in Mines.

It is heartening that the Mines Safety & Productivity Council is making effort to inculcate safety awareness among mining fraternity by bringing out Souvenir incorporated with DGMS circulars, technical papers & safety messages to upgrade knowledge in mining technology & inculcate the Safety Awareness.

I convey my good wishes to the organisers for the success of the Mines Safety Week Celebrations 2018.

BRV Susheel Kumar

ADITYA BIRLA

UltraTech

S. K. Gupta
COO & Cluster Head-Mfg.

MESSAGE

I am indeed very happy to know that the Mines Safety & Productivity Council, Hyderabad Region is celebrating 34th Mines Safety Week, under the aegis of Directorate General of Mines Safety, being hosted by M/s. UltraTech Cement Limipted, Balaji Cement Works, Budawada.

I am also happy to know that Mines Safety & Productivity Council will bring out a Souvenir containing DGMS Circulars, technical papers & Safety Messages for the benefit of mine owners, managers and employees to upgrade their knowledge in Mining technology & to inculcate the Safety Awareness among the Mining Community.

I whole heartedly extend my warm greetings to the participants and wish the Mines Safety & Productivity Council a great success.

UltraTech CEMENT
The Engineer's Choice

UltraTech Cement Limited
Registered Office : Ahura Centre, B - Wing, 2nd Floor, Mahakali Caves Road, Andheri (East), Mumbai 400 093, India
T : +91 22 6691 7800 / 2926 7800 | F : +91 22 6692 8109 | W : www.ultratechcement.com / www.adityabirla.com | CIN : L26940MH2000PLC128420

ADITYA BIRLA

UltraTech

Sivaraj Varadharajan
Sr. Vice President (Technical)

MESSAGE

As we all know that the Mines Safety & Productivity Council, Hyderabad Region is organising every year Mines Safety Week under the aegis of Directorate General of Mines Safety and this year is 34th safety week observance of this region, we at M/s. UltraTech Cement Limited, Balaji Cement Works, Budawada all are extremely delighted to host the same.

Observance of "Mines Safety Week" is aimed at driving and enhancing the Safety awareness among workers, supervisors and officers. It is also an occasion to demonstrate the best practices in the field of Safety. With rapid changing scenario, companies should adopt Latest technology, implement best practices across the industry seamlessly and manage the inherent risk & hazards scientifically. Safety should be a prime consideration factor for all activities. It is important that spirit of safety is also perpetuated among all, thus contributing to achieve the noble cause of "**Zero Incident**" in Mines.

I extend my best wishes for the success of Safety week celebrations and hope for safe and productive working of mines.

(V. SIVARAJ)

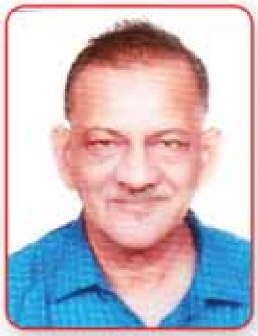
UltraTech CEMENT The Engineer's Choice

UltraTech Cement Limited
(Unit : Balaji Cement Works)
Village + Pst : Budawada, Mandal : Jaggaiahpet, Dist. Krishna, Andhra Pradesh - 521 175.
T: (08654) 285011-18 | W : www.ultratechcement.com
Redg. Office: 'B' Wing, Ahura Centre, 2nd Floor, Mahakali Caves Road, Andheri (East), Mumbai 400 093.
T: +91 22 6691 7800 | CIN: L26940MH2000PLC128420

MINES SAFETY & PRODUCTIVITY COUNCIL- 2018 HYDERABAD

Host : M/s. UltraTech Cement Limited-Budawada

ORGANISERS



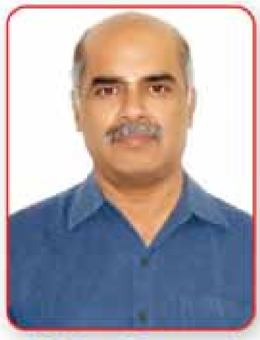
Shri Vidyapathi
Chief Patron

Shri M. Narasaiah
Patron

Shri Shyam Mishra
Convener

Shri Mohammed Niyazi
Co-Convener

Shri Sivaraj Varadharajan
Chairman



Shri M Sai Ramesh
Vice Chairman

Shri K N Sidda Reddy
Secretary

Shri K Sudhakar Raju
Jt. Secretary

Shri Chetan Mangal
Treasurer

MINES SAFETY & PRODUCTIVITY COUNCIL- 2018 HYDERABAD

Host : M/s. UltraTech Cement Limited-Budawada

ORGANISERS-ZONE-I

(Host : M/s. NCL Industries Limited)

Shri S. Chakradhar
Chairman

Shri G. S Subba Rao
Secretary

Shri Ramesh
Treasurer

ORGANISERS-ZONE-III

(Host : M/s. Zuari Cements Limited)

Shri SV Murali Prasad Reddy
Chairman

Shri KVS Sharma
Secretary

Shri Nagabhushan
Treasurer

MINES SAFETY & PRODUCTIVITY COUNCIL- 2018 HYDERABAD

Host : M/s. UltraTech Cement Limited-Budawada

ADVISORY COMMITTEE


Shri K Vijay Kumar


Shri S Putta Raju


Shri Shyam Sundar Soni


Shri N. Balasubramanyam


Shri Rajiv Krishna Kumar


Shri K D Ram


Shri A. Rambabu


Shri Johnson Yohan


Dr. Kaushik Sarkar


Shri P. Bala Krishna

MINES SAFETY & PRODUCTIVITY COUNCIL- 2018 HYDERABAD

Host : M/s. UltraTech Cement Limited-Budawada

EXECUTIVE COMMITTEE

Shri HD. Nagaraja

Shri K Rajesekhar Reddy

Shri Rajesh Garg

Shri PK Sinha

Shri K Karunakar Rao

Shri N P Sahare

Shri Vijay Keshav Chakunde

Shri M Vengopal Reddy

Shri T Mallikarjun Reddy

Shri Kalyan Chakravarthy

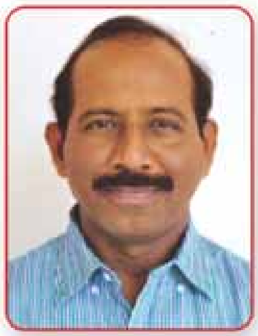
Shri P Jani Reddy

Shri V Venkata Ramana

MINES SAFETY & PRODUCTIVITY COUNCIL- 2018 HYDERABAD

Host : M/s. UltraTech Cement Limited-Budawada

EXECUTIVE COMMITTEE



Shri N. Hari Prasada Rao

Shri M. Srinivasa Reddy

Shri G. Chandra Sekhar

Shri G.V. Subba Rao

Shri M. Ramchander

Shri C.V. Ramanaiah

Shri Ch Srinivas

MINES SAFETY & PRODUCTIVITY COUNCIL- 2018 HYDERABAD

Host : M/s. UltraTech Cement Limited-Budawada

TRADE TEST COMMITTEE


Shri P. Bala Krishna


Dr. Kaushik Sarkar


Shri C V Ramanaiah


Shri V Subramanyam


Shri KVS Sharma


Shri G.S. Subba Rao


Shri R Kedarnath Reddy


Shri K Srinivas Rao


Shri Anil Kumar


Shri Y Jugal Kishore


Shri D Pavan Kumar


Shri K Sudhakar Raju

MINES SAFETY & PRODUCTIVITY COUNCIL- 2018 HYDERABAD

Host : M/s. UltraTech Cement Limited-Budawada

SOUVENIR COMMITTEE


Shri Rajiv Krishna Kumar


Shri A. Rambabu

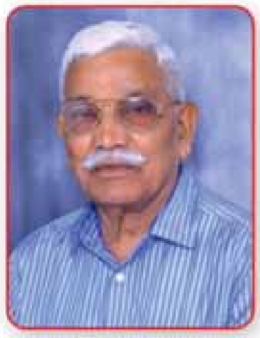

Shri Johnson Yohan


Shri KVS Sharma


Shri T Mallikarjun Reddy


Shri Appala Raju


Shri G.S. Subba Rao


Shri K Peter


Shri Manoj Bihari


Shri PVV Tagore


Shri M Kanaka babu

MINES SAFETY & PRODUCTIVITY COUNCIL- 2018 HYDERABAD

Host : M/s. UltraTech Cement Limited-Budawada

INSPECTION COMMITTEE


Shri Johnson Yohan


Shri K D Ram


Shri Rajiv Krishna Kumar


Shri A. Rambabu


Shri P. Bala Krishna

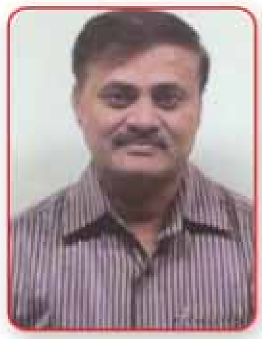

Shri K. Rajasekhar Reddy


Shri V. Subramanyam


Shri C V Ramanaiah


Shri K N Sidda Reddy


Shri Manoj Bihari


Shri M. Srinivasa Reddy

MINES SAFETY & PRODUCTIVITY COUNCIL- 2018 HYDERABAD

Host : M/s. UltraTech Cement Limited-Budawada

INSPECTION COMMITTEE

Shri K Rami Reddy

Shri M. Ravinder Reddy

Shri Narasimhulu

Shri K.V. Suresh Reddy

Shri G.S. Subba Rao

MINES SAFETY & PRODUCTIVITY COUNCIL- 2018 HYDERABAD

Host : M/s. UltraTech Cement Limited-Budawada

PURCHASE & RECEPTION COMMITTEE

Shri Vijay Keshav Chakunde

Shri K N Sidda Reddy

Shri C V Ramanaiah

Shri B. Gurusekar Reddy

Shri D Jwannes Reddy

Shri KVS Sharma

Shri G.S. Subba Rao

Shri G. Chandra Sekhar

Shri K Sudhakar Raju

Shri P Jani Reddy

Shri Vasanth Kumar V

Shri K. Gopi

MINES SAFETY & PRODUCTIVITY COUNCIL- 2018 HYDERABAD

Host : M/s. UltraTech Cement Limited-Budawada

First General Body Meeting

Left-Right : Sri K N Sidda Reddy, Sri Sai Ramesh, Sri M. Narasaiah, Sri Vidyapathi, Sri Sivaraj Varadharajan, Sri Mohammed Niyazi, Sri Balasubramanyam

First Executive Body Meeting

Left-Right : Sri S Puttaraju, Sri K Vijay Kumar, Sri M Narsaiah, Sri Sivaraj Varadharajan, Sri Shyam Mishra, Sri Mohammed Niyazi, Sri KN Sidda Reddy

DGMS Circulars

सत्यमेव जयते
भारत सरकार
Government of India
श्रम एवं रोजगार मंत्रालय
Ministry of Labour & Employment
खान सुरक्षा महानिदेशालय
Directorate General of Mines Safety

No. DGMS/Exam/Genl/2018/ 01 Dhanbad, dated- 26/10/2018

To,

The Owners, Agents and Managers of all Coal and Metalliferous Mines.

Subject: - Online payment of Examination Fee under the CMR, 2017 and MMR, 1961.

Sir,

The Examination fees under the Coal Mines Regulation, 2017 (earlier CMR, 1957) and the Metalliferous Mines Regulations, 1961 are being paid by the applicant by way of either Indian Postal Order (IPO) or Demand Draft (DD) of Banks.

In pursuance of the policy of the Govt. to promote e-governance and digital transaction, a system of online payment of Examination fee has been introduced. The payment is enabled through website namely www.bharatkosh.gov.in. In this regard you are request to visit DGMS website "www.dgms.gov.in for illustration of the payment process.

You are requested to give wide publicity in the field including through VTCs/GVTCs, regarding online payment of Examination fees.

Yours faithfully

26.10.18

(Prasanta Kumar Sarkar)
Director General of Mines Safety.

Government of India
भारत सरकार
Ministry of Labour and Employment
श्रम एवं रोजगार मंत्रालय
Directorate General of Mines Safety
खान सुरक्षा महानिदेशालय

सत्यमेव जयते

No. DGMS (Legis.) Circular No. 01 of 2018 Dhanbad, Dated 22-03-2018

सेवा में,

The Owner, Agent, Managers of all Oil Mines & the Manufacturers.

विषय: Standard for emergency escape device used in oil mines.

Your attention is drawn to the provision of Regulation 38(1) of Oil Mines Regulations, 2017, which requires that the owner, agent and manager of a mine shall ensure that an escape device with escape line and slide of adequate strength, as per the standard specified for the purpose by the Chief Inspector of Mines by a general or special order, is installed and maintained on every monkey board in such a manner that persons may come down safely from the monkey board to ground level in an emergency.

In this regard, a committee was constituted in which experts from Government test house, Oil industry, manufacturers and officers of DGMS were participated. After detailed discussion and deliberations by the committee members in the meetings, the draft standard for emergency escape device specified for the purpose used in oil mines was framed and is given below.

1.0 The Manufacturer shall:

1.1 have adequate knowledge, facility for proper manufacturing and testing of every part of the unit and shall have good workmanship. The product shall be reliable and free from any defects.

1.2 use the material in the emergency escape device shall be of good construction, suitable material of adequate strength and free from visible defect and shall be properly maintained. An every emergency escape device or any part thereof fitted in the device shall not be made of alloy and material likely to give incendive frictional sparks. The components/material used in the device shall conform to relevant BIS/ISO/OISD/Internationally accepted standards wherever applicable.

1.3 be fully responsible for quality and reliability of the emergency escape device.

1.4 furnish all the design, calculations, detailed drawings, set of working tools ,test reports/certificates or any other information of pertinent to their product(s) to the user(s), along with each consignment.

22/3/18

2.0 Testing and Examination:

2.1 The emergency escape device shall be tested for its accuracy, safe working, and reliability conform to BIS/API/OISD/ISO when formulated or equivalent internationally accepted standards at any test house prescribed under Para 6.0 of Approval Policy, 2015 (Second Revision) of DGMS or its revised version.

2.2 Any component in which defect is noticed shall be marked defective and shall not be supplied to any mine.

2.3 Non destructive test shall be conducted for vital components used in the emergency escape device, for its material composition, grade and other mechanical properties conform to relevant BIS/API/ISO/OISD/Internationally accepted standards at any test house prescribed under Para 6.0 of Approval Policy, 2015 (Second Revision) of DGMS or its revised version.

3.0 Marking:

The manufacturer shall ensure that each emergency escape device legibly marked on the body mentioning the following:

(a) The manufacturer's name,

(b) Serial and Batch number,

(c) The month and year of manufacture,

(d) Any other marking required by the applicable Oil industrial safety standards.

4.0 General requirements:

4.1 On every monkey board in rig there shall be installed and maintained an escape line, escape device with a slide of adequate strength in such a manner that persons can come down safely from the monkey board to ground level in an emergency.

4.2 Escape line shall be securely fastened to the girt immediately above the monkey board and it shall be securely anchored to ground at a distance, from centre of cellar pit, not less than the height of the monkey board from the ground.

4.3 The track rope shall conform to IS 2266:2002or its revised version /API/ISO/OISD/any Internationally accepted standards with minimum size of 12mm diameter, construction of stranded 6x19, galvanized or ungalvanized, non-lubricated and fiber core or steel core.

4.4 The track rope of the emergency escape device shall have sufficient sag to avoid straining due to pre-tensioning. The track rope or any part thereof shall have no damage or kink.

4.5 The haulage rope shall conform to IS 3459:2009 or its revised version/API/ISO/OISD/any Internationally accepted standards with minimum size of 6mm diameter, construction of stranded 6x19, galvanized or un galvanized, non lubricated and fiber or steel core.

4.6 The minimum breaking load of wire rope shall conform to relevant BIS/API/OISD/any international accepted standards.

4.7 Care shall be taken to avoid any twisting or kinking of the wire rope while un-reeling of rope during installation.

24/3/18

4.8 The life of rope shall be fixed by the manager in consultation with competent person with following additional conditions:

a. Reduction in diameter of the rope is 10% of the original diameter when new, anywhere along the length of the rope.

b. Broken wires with in any one strand exceed 15% of the total numbers of wires in that strand.

4.9 A suitable speed control system shall be provided in the emergency escape device. In addition to the speed control system a suitable hand brake shall be provided in the chair unit which is easily approachable to the person sliding down.

4.10 The pulleys of braking unit of the emergency escape device shall be checked for free rotation prior to each installation and they shall be checked for any wear and make it free from slippage.

4.11 The chair(s) shall be ergonomically designed and provided with a cushioning seat and safety belt to give maximum comfort to the person throughout the travel period.

4.12 Ensure safe & easy access of the chair to the Topman at monkey board at all the time.

4.13 The swing of the chair unit while embarking and during riding shall be avoided. An additional lifeline may be provided under the chair unit to prevent hard landing with controlled speed.

4.14 An every landing shall be provided with suitable shock absorber of adequate strength for cushioning to prevent hard landing.

4.15 The landing area on the ground shall be provided with adequate amount of loose sand for smooth landing.

4.16 The speed of the chair shall be fixed by the manager in consultation with competent person/Installation manager and original equipment manufacturer and in any case it shall not exceed 2.2 m/s.

5.0 Responsibilities of Owner ,Agent and Manager(User):

5.1 The user(s) industry shall also be responsible to ensure correct quality and conformity to the prescribed specifications by the manufacturer and also take proper care during the installation of emergency escape device and also while in use. When emergency escape devices supplied to the mine, the mine shall ensure that the system has been adequately designed for the particular rig.

5.2 The user(s) shall visit the manufacturer's works to ensure the adequate manufacturing and testing facilities are available with the manufacture.

5.3 A competent person / installation manager, shall inspect the emergency escape device in accordance with regulation 38 of Oil Mines Regulation, 2017 for installation, testing and maintenance in accordance with clause 4.0 of this standard and its performance shall be recorded in a soft/hard copy with signature and counter signed by the manager or person authorized by the manager of the mine and kept available at the mine office. Any defects observed shall be rectified immediately.

22/3/18

5.4 The user shall ensure/observe the performance of emergency escape device for a period of three months for field trial of fresh consignment in consultation with the manufacturer and the results of joint field observations particularly in respect of malfunctioning of any unit/part and also point out any shortcoming in the installation likely to adversely affect the safety shall be rectified and recorded in a soft/hard copy and signed by an installation manager and counter signed by the manager or person authorized by the manager and kept available at the mine office.

5.5 The user shall also have the responsibility to get the valid test reports/certificates from the manufacturer while purchasing and using the emergency escape device in the Oil mines.

5.6 In-situ examination of emergency escape device & it's vital components and wire rope for non destructive test conform to relevant BIS/API/ISO/OISD/Internationally accepted standards shall be conducted once in a year by any test house prescribed under Para 6.0 of Approval Policy, 2015(Second Revision) of DGMS or its revised version.

6.0 Miscellaneous

6.1 The Chief Inspector of Mines or an Inspector of Mines may inspect, check and examine the manufacturing facilities at any time and get samples tested during the course of inspection or send such samples for testing at any prescribed test houses/ laboratories at the cost of the manufacturer.

6.2 The Chief Inspector of Mines or an Inspector of Mines may inspect, check and examine the emergency escape device at any time in the mine and get samples tested during the course of inspection or send such samples for testing at any prescribed test houses/ laboratories at the cost of the Owner, Agent and Manager of the mine.

6.3 All user(s), manufacturers and test houses shall adhere to the above mentioned standard while testing, before supplying and using of an emergency escape device. If any deviation or defects found in the product supplied or used in the mine, shall be brought to the notice of this Directorate.

6.4 The above standard for an emergency escape device specified for the purpose by the Chief Inspector of Mines by a general order under regulation 38(1) of Oil Mines Regulations, 2017.

6.5 All circulars/ approvals issued by DGMS from time to time, relevant to the equipment shall be complied with.

6.6 The Chief Inspector of Mines may by an order in writing and subject to such condition as may be specified therein require any modifications or additional requirements to be included in this standard on merit of the case.

22.03.18

(Prasanta Kumar Sarkar)
Director General of Mines Safety

24/3/18

Government of India
भारत सरकार
Ministry of Labour and Employment
श्रम एवं रोजगार मंत्रालय
Directorate General of Mines Safety
खान सुरक्षा महानिदेशालय

No. DGMS (Legis.)/ Tech. Circular No 02 of Dhanbad, Dated 10-10-2018

सेवा में,

The Owner, Agent, Manager of all Oil Mines & the Manufacturers.

विषय: Standard for Design, construction, installation and testing of lifting appliance, gear and rope used in Oil Mines.

Design, construction and installation of lifting appliance, gear and rope used in Oil Mines shall be in accordance with the standard specified by the Chief Inspector of Mines by a General or Special Order in writing as required under Regulation 105(2)(a) of Oil Mines Regulations, 2017.

A committee of experts from Government test house, Oil industry, Manufacturers and DGMS was constituted and after detailed discussion and deliberations by the committee, standard for design, construction and installation of lifting appliance, gear and rope used in Oil Mines was framed. The standard is prescribed below:

1.0 General requirements:

1.1 **Lifting appliances and gears: -**

1.1.1 The design, construction and installation of lifting appliance and gear shall conform to relevant BIS / ISO / OISD / Internationally accepted standards like API 4F, API 9A, API 8C etc. wherever applicable.

1.1.2 Operation, maintenance & inspection of lifting appliances and gears shall conform to OISD – GDN -203 of 2003 or its revised version / BIS when formulated or equivalent internationally accepted standards.

1.2 **Ropes:-**

1.2.1 The minimum size of wire rope shall be of 12mm diameter and shall conform to IS 2266:2002 / IS 4521:2001 (or its revised versions) / OISD / API /any other equivalent internationally accepted standards.

1.2.2 The minimum breaking load of wire rope shall not be less than eight times the maximum lifting load on the rope.

1.2.3 Care shall be taken to avoid any twisting or kinking of the rope while un-reeling the rope during installation / Handling.

1.2.4 Rope life and discarding factors: The life of rope shall be fixed by Manager of the Mine in consultation with competent person and in no case it shall exceed the life specified by the Manufacturer and shall be discarded on following additional conditions:

a. When reduction in diameter of the rope is 10% of the original diameter when new, anywhere along the length of the rope.

b. When broken wires within any one strand exceed 15% of the total numbers of wires in that strand.

2.0 Testing and Examination:

2.1 The lifting appliances, gears and ropes shall be tested for its Quality, safe working and reliability conforming to OISD – GDN -203 of 2003 or its revised version /BIS when formulated or equivalent internationally accepted standards at any test house prescribed under Para 6.0 of Approval Policy, 2015 (Second Revision) of DGMS or its revised version.

2.2 Any component in which defect is noticed shall be marked defective and shall not be supplied to any mine.

3.0 Marking: The manufacturer shall ensure that each lifting appliance, gear and rope (Sling etc) are legibly and permanently marked on unwearable portion with the following:

(a) The manufacturer's name;
(b) Serial and Batch number;
(c) The month and year of manufacture;
(d) Safe Working Load;
(e) Identification mark bearing with certificates of Test and Examination; and
(e) Any other marking required by the applicable OISD.

4.0 The Manufacturer shall-

4.1 have adequate knowledge, facilities for proper manufacturing and testing of every part of the unit and shall have good workmanship. The product shall be reliable and free from any defects.

4.2 ensure that the materials used in the lifting appliances, gears and ropes are of good design, construction, suitable material of adequate strength and free from visible defects. Alloys or materials likely to give incendive frictional sparks shall not be part of lifting appliance, gears and ropes.

4.3 be fully responsible for design, quality and reliability of every lifting appliances, gears and ropes.

4.4 furnish design calculations, detailed drawings or any other information pertinent to their product(s) to the user(s), along with each consignment.

4.5 provide certificate of test and examination along with Operation and Maintenance Instruction manual to the User(s), along with each consignment.

5.0 Responsibilities of Owner, Agent and Manager (User):

5.1 The user(s) shall ensure that the lifting appliances, gears and ropes have been adequately designed for the particular rig and proper care is taken during installation and use of lifting appliances, gears and ropes.

5.2 The user(s) shall visit the manufacturer's facilities to ensure availability of adequate manufacturing and testing facilities.

5.3 In case of fresh consignment, the user shall observe the performance of lifting appliances, gears and ropes for a period of three months of field trial in consultation with the manufacturer. Malfunctioning of any unit / part and shortcoming(s) in the installation which are likely to have adverse effect on safety shall be immediately stopped and attended to and recorded in soft / hard copy with signature of competent person / Installation Manager and counter signed by the Manager or person authorized by the Manager of the mine. This record shall be kept available at the mine office.

5.4 Competent person / Installation Manager shall ensure that installation, testing and maintenance of the lifting appliances, gears and ropes are in accordance with clause 1.0 and 2.0 of this General Approval. Their performance shall be observed and recorded in a soft / hard copy, signed by competent person / Installation Manager and counter signed by the Manager or person authorized by the Manager of the mine. The record shall be kept available at the mine office. Any defects observed shall be rectified immediately.

5.5 The user shall also have the responsibility to obtain valid test reports / certificates, instruction manuals, etc, from the manufacturer during procurement.

5.6 In-situ Non Destructive testing of vital components of lifting appliances, gears and ropes shall be conducted once in a year conforming to relevant BIS / ISO / OISD / Internationally accepted standards by any test house prescribed under Para 6.0 of Approval Policy, 2015 (Second Revision) of DGMS or its revised version.

6.0 Miscellaneous:

6.1 The Chief Inspector of Mines or an Inspector of Mines may inspect, check and examine the manufacturing facilities at any time and get samples tested during the course of inspection or send such samples for testing at any prescribed test houses / laboratories at the cost of the manufacturer.

6.2 The Chief Inspector of Mines or an Inspector of Mines may inspect, check and examine the lifting appliances, gears and ropes at any time in the mine and get their samples tested during the course of inspection or send such samples for testing at any prescribed test houses/ laboratories at the cost of User(s).

6.3 All user(s), manufacturers and test houses shall adhere to above mentioned standards and parameters while testing and before supplying the lifting appliances, gears and rope. Any deviation or defects found in the product supplied or used in the mine, shall be brought to the notice of this Directorate.

6.4 The lifting appliances, gears and ropes confirming to the standards, parameters and testing as mentioned above, shall be considered as approved by the Chief Inspector of Mines by a General Order under Regulation 105(2)(a) of the Oil Mines Regulation, 2017.

6.5 All circulars/approvals issued by DGMS from time to time, relevant to the equipment shall be complied with.

6.6 The Chief Inspector of Mines by an order in writing and subject to such conditions as may be specified therein require any modifications or additional requirements, to be included in this standard on merit of the case.

10.10.18

(Prasanta Kumar Sarkar)
Director General of Mines Safety

सत्यमेव जयते
भारत सरकार
Government of India
श्रम एवं रोजगार मंत्रालय
Ministry of Labour & Employment
खान सुरक्षा महानिदेशालय
Directorate General of Mines Safety

No. DGMS (Legis.) Circular No. 03 of 2018 Dhanbad, dated 08-11-2018

To

All Owners, Agents and Managers of Coal Mines

Subject: Gazette notifications on Forms, Standards, Procedures, Conditions, format of Notices and Inspection Reports, Bye-Laws, etc. under different provisions of the Coal Mines Regulations, 2017

Sir,

The following Gazette notifications published in the Gazette of India on Forms, Standards, Procedures, Conditions, format of Notices and Inspection Reports, Bye-Laws for grant of certificates on exemption basis and for conduct of examinations, etc. under different provisions of the Coal Mines Regulations (CMR), 2017 have been uploaded on DGMS official website, i.e. www.dgms.gov.in for information and strict compliance:

Sl. No.	Gazette Notification No.	Subject	Published in Gazette of India in	Date of publication
1.	G.S.R. 673 (E)	List of appliance, equipment, machinery and other material required to be approved by special or general order	Part II, Section 3, Sub-section (i)	25th July, 2018
2.	G.S.R. 910(E)	Bye-laws for the grant of certificates on exemption basis and for conduct of examinations for Manager's Certificate.	Part II, Section 3, Sub-section (i)	24th September, 2018
3.	G.S.R. 911(E)	Bye-laws for the grant of certificates on exemption basis and for conduct of examinations for Surveyor's Certificate.	Part II, Section 3, Sub-section (i)	24th September 2018
4.	G.S.R. 912(E)	Bye-laws for the grant of certificates on exemption basis and for conduct of Examinations for Overman's Certificate.	Part II, Section 3, Sub-section (i)	24th September 2018
5.	G.S.R. 913(E)	Bye-laws for the grant of certificates and for conduct of examinations for Sirdar's Certificate.	Part II, Section 3, Sub-section (i)	24th September 2018
6.	G.S.R. 914(E)	Bye-laws for the grant of certificates and for conduct of examinations for Gas Testing Certificate.	Part II, Section 3, Sub-section (i)	24th September 2018
7.	G.S.R. 915(E)	Bye-laws for the grant of certificates and for conduct of examinations for Winding Engineman's Certificate	Part II, Section 3, Sub-section (i)	24th September 2018
8.	G.S.R. 972(E)	Daily Report of inspection by Overman In-charge of Opencast Working of a mine under Regulation 47(7)(d) of the CMR, 2017	Part II, Section 3, Sub-section (i)	4th October, 2018
		Daily Report of inspection by Overman In-charge of belowground workings of a mine under Regulation 47(7)(d)of the CMR, 2017		
9.	G.S.R. 973(E)	Specifications of limits of error	Part II, Section 3, Sub-section (i)	4th October, 2018

Sl. No.	Gazette Notification No.	Subject	Published in Gazette of India in	Date of publication
10.	G.S.R. 974(E)	Notice about new winding installation	Part II, Section 3, Sub-section (i)	4th October, 2018
11.	G.S.R. 975(E)	Maximum man-winding speeds	Part II, Section 3, Sub-section (i)	4th October, 2018
12.	G.S.R. 976(E)	Conditions for Haul Roads	Part II, Section 3, Sub-section (i)	4th October, 2018
13.	G.S.R. 977(E)	Daily Report of inspection by Sirdar of opencast working of a mine under Regulation 129 (8) of the CMR, 2017 Daily Report of inspection by Sirdar of underground workings of a mine under Regulation 129 (8) of the CMR, 2017	Part II, Section 3, Sub-section (i)	4th October, 2018
14.	G.S.R. 978(E)	Procedure for conducting air-borne respirable dust survey	Part II, Section 3, Sub-section (i)	4th October, 2018
15.	G.S.R. 979(E)	Type of Stone dust barrier to be provided in a belowground coal mine	Part II, Section 3, Sub-section (i)	4th October, 2018
16.	G.S.R. 980(E)	Conditions for installation of two or more auxiliary fans in the same ventilating district or split	Part II, Section 3, Sub-section (i)	4th October, 2018
17.	G.S.R. 981(E)	Standards of illumination in opencast coal mines	Part II, Section 3, Sub-section (i)	4th October, 2018
18.	G.S.R. 982(E)	Conditions for transport of explosives in bulk	Part II, Section 3, Sub-section (i)	4th October, 2018
19.	G.S.R. 983(E)	Conditions for site selection for establishing a Reserve Station	Part II, Section 3, Sub-section (i)	4th October, 2018
20.	G.S.R. 984(E)	Conditions for use of Ammonium Nitrate Fuel Oil (ANFO)	Part II, Section 3, Sub-section (i)	4th October, 2018
21.	G.S.R. 985(E)	Conditions for Deep-Hole blasting in opencast coal mine	Part II, Section 3, Sub-section (i)	4th October, 2018
22.	G.S.R. 986(E)	Conditions for conducting blasting in fire areas in an opencast coal mine	Part II, Section 3, Sub-section (i)	4th October, 2018
23.	G.S.R. 987(E)	Safety features and devices to be provided in Heavy Earth Moving Machinery (HEMM) including trucks and tippers	Part II, Section 3, Sub-section (i)	4th October, 2018
24.	G.S.R. 988(E)	Notice of intention or proposal of exploration for methane / commencement of extraction of methane	Part II, Section 3, Sub-section (i)	4th October, 2018
25.	G.S.R. 989(E)	Notice of closure, abandonment or discontinuance of exploration / extraction of methane	Part II, Section 3, Sub-section (i)	4th October, 2018
26.	G.S.R. 990(E)	Form of Annual returns under Regulation 222 of the CMR, 2017	Part II, Section 3, Sub-section (i)	4th October, 2018
27.	G.S.R. 991(E)	Conditions and other details for Drilling operations in connection with methane exploration or extraction in belowground coal mine	Part II, Section 3, Sub-section (i)	4th October, 2018
28.	G.S.R. 992(E)	Conditions and other details for methane gas transportation in belowground	Part II, Section 3, Sub-section (i)	4th October, 2018
29.	G.S.R. 993(E)	Course of training in the use of self – rescuer	Part II, Section 3, Sub-section (i)	4th October, 2018
30.	G.S.R. 1010 (E)	Forms under different provisions of the Coal Mines Regulations, 2017	Part II, Section 3, Sub-section (i)	9th October, 2018

[File No. Z- 20045/01/2018/S&T(HQ)]

08.11.18

(Prasanta Kumar Sarkar)
Director General of Mines Safety

सत्यमेव जयते

भारत सरकार
Government of India
श्रम एवं रोजगार मंत्रालय
Ministry of Labour & Employment
खान सुरक्षा महानिदेशालय
Directorate General of Mines Safety

No. DGMS (S&T)/(Tech.) Circular No. 01 Dhanbad, Dated 13-08-2018.

To,

All Owners, Agents and Managers of coal and metalliferous mines

Sub: Standards and Safety Provisions of Diesel Equipment for using in belowground coal and metalliferous mines.

1.0 Background:

Use of diesel equipments in belowground coal and metalliferous mines in India is increasing in recent past, due to its advantages like flexibility in operation, less interdependency with other systems, higher mobility and high power, etc. Diesel operated shuttle/ram cars, LHDs, free steered vehicles are under operation in mechanised belowground coal mines and diesel operated LPDTs/trucks, high capacity loaders/LHDs, drills and other miscellaneous equipments are being used in underground metalliferous mines. However, use of diesel equipment in belowground mines is having inherent health and safety hazards like diesel emissions, noise, dust, fire of fuel and lubricants, explosion of inflammable gasses, collision of the vehicles, caught in between, etc.

In view of this, the eleventh National Conference on Safety in Mines, which was held in New Delhi on 4th & 5th, July, 2013, recommended to appoint an expert Committee to examine and frame standards and safety provisions for diesel equipments for using in belowground Coal and Non-coal Mines.

2.0 Constitution of Committee:

Accordingly, DGMS has constituted a Committee in the month of February, 2017 with representatives from coal companies and metalliferous mines companies, academic Institution, and officers of DGMS under Chairmanship of Dy. Director General of Mines safety (Mech.), DGMS.

The Committee, based on the inputs, inferences drawn from several meetings with stakeholders on the above subject, recommended standards and safety provisions of diesel equipments for using in belowground coal and metalliferous mines.

3.0 Standards and Safety Provisions:

This standard specifies design requirements of diesel equipments and examinations, testing, maintenance & monitoring of the equipments for its safe operation/use in underground coal and metalliferous mines. It also specifies minimum ventilation requirements, threshold limits of noxious and inflammable gasses and Diesel Particulate Matter (DPM) and its monitoring in mines, requirements of roadways for diesel equipment, training and competencies required for the personnel for operating, testing, maintaining the equipments, etc.

In view of the above, the standards and safety provisions of diesel equipments for using in belowground coal and metalliferous mines has been enclosed as Annexure for strict compliance.

13.08.18

(Prasanta Kumar Sarkar)
Director General of mines Safety

Encl.: As above

Annexure to DGMS (S&T)/(Tech.) Circular No. 01 Dhanbad, Dated 13/8/2018

Sub: Standards and Safety Provisions of Diesel Equipment for using in belowground coal and metalliferous mines.

1.0 General design and Construction

Every diesel equipment to be used in underground mines shall be of good construction, suitable material, adequate strength, free from visible defects and shall be properly maintained. The diesel equipment and each accessories thereof, except the tyres (which shall be of anti-static material), shall so far as is practicable be constructed of non-inflammable material and any inflammable material, if used, shall be shrouded with a substantial non-inflammable covering.

1.1 Ergonomic and anthropometric requirements for operator and passenger compartments in the diesel equipment

1.1.1 All diesel operated equipment shall be provided with cabin/canopy for operator, of sound construction, suitable material and adequate strength. Such operator cabin shall be provided with 'Falling Object Protective Structure' (FOPS) and "Roll Over Protective Structure" (ROPS) in accordance with ISO – 3449:2005 and ISO – 3471:2008 respectively or its revised versions or any internationally accepted standards.

1.1.2 Passengers' compartment shall be of sound construction, suitable material and adequate strength so that the passengers would not be injured in case of dangerous occurrence or accident.

1.1.3 Protection shall be provided to avoid possible ingress of material/objects from the surroundings of the equipment into the operator's and passengers' compartments.

1.1.4 Safe access to the operator and passenger compartments shall be provided. The entrance to any compartment shall be designed to prevent personnel being thrown - out of the equipment.

1.1.5 All diesel operated equipment with closed cabin shall be provided with an emergency exit.

1.1.6 The operator and passengers' compartments shall be designed to prevent any part of a person's body projecting outside the envelope of the compartment, or coming into accidental contact with the roof, side of the roadway or with moving parts of the equipment.

1.1.7 The design of the operator's space must allow for free movement and comfortable operating postures for the operator. Any manoeuvres necessary for the operation of the equipment should be able to be performed safely and without fatigue or discomfort. Sufficient leg space both vertically and horizontally is essential for comfort and safety in the operation of foot controls.

1.1.8 The operator seat shall be ergonomically designed to permit safe operation. The design of the seat (s) shall have provision for horizontal, vertical and/or swivel adjustment to accommodate operator(s). Compartment space shall be sufficient to allow for the full range of adjustment required to operate the equipment safely and comfortably. The seat(s) shall be covered and padded so as to minimise discomfort.

1.1.9 The seat and it's suspension shall be so designed to reduce vibration transmitted to the operator to the lowest level that can be reasonably achieved.

1.1.10 Seat belt(s) shall be fitted to every operator and passenger's compartment of the equipment.

1.2 Noise: The operator and passengers shall not be exposed to noise level that exceeds an eight hour equivalent continuous sound pressure level of 85 dB(A) and wherever it exceeds 85 dB(A), Personnel Protection Equipment (PPE) of adequate strength shall be used by the operators and passengers.

1.3 Visibility: The operator's field of view shall comply with the acceptance criteria specified in ISO 5006.3:2006 when tested in accordance with ISO 5006.1:2006 and evaluated in accordance with ISO 5006.2:2006 or its revised versions or any internationally accepted standards.

1.4 Vibration: The vibration exposure limits of the operator and passengers shall comply with the acceptance criteria specified in ISO 2631:2014 or its revised version or any internationally accepted standards.

1.5 Controls and display system at operator cabin

1.5.1 Controls shall be laid out and designed to allow easy and safe operation based on the principle that a given direction of movement of any control produces a consistent and expected effect. The surfaces of frequently used pedals shall be fitted with skid resistant type materials.

1.5.2 Marking of all controls shall be indelible and illuminated to enable the operator to see gauges necessary for safe driving without the use of a cap lamp.

1.5.3 The distance between control levers, adjacent foot pedals, knobs, handles, operator's body and other machine parts shall be sufficient to allow unhindered operation without unintentional actuation of adjacent controls.

1.5.4 The controls shall be of suitable design and construction and arranged so that they are able to be operated with ease from the operator's seat and within the operator's force limits.

1.6 Guards and Shields

1.6.1 Shields shall be fitted to all vital components of the equipment to prevent its damage.

1.6.2 Guards or shields shall be provided in the vicinity of exhaust and turbocharger to prevent fuel or oil spraying on hot surfaces.

1.6.3 All dangerously exposed moving parts of the equipment shall be provided with suitable guards of substantial construction to prevent injury to personnel.

1.6.4 All pipes and hoses of fuel oil and lubricants shall be covered so that oil from any leakage cannot contact any exposed metal surface where the temperature exceeds 120^0C under any condition of the equipment.

2.0 General safety provisions

2.1 Braking system

2.1.1 Efficient braking systems shall be provided for every movable equipment.

2.1.2 The following brakes shall be provided in the every equipment conforming to the standard ISO 3450: 2011 or its revised version or any internationally accepted standards:

a) Service brake - to be used as the primary braking system during normal operation of the equipment.

b) Emergency brake - to be applied by the operator in the event of a failure of the service brake.

c) Parking brake - used to prevent movement of stationary equipment.

Provided that at least one of the brakes shall be "fail safe", i.e. the spring applied-hydraulically released (SAHR).

2.1.3 The brakes should be activated automatically if:

a) Cabin door is not fully closed, if door is provided
b) Engine oil pressure is low,
c) Hydraulic brake pressure is low,
d) Steering control valve fault is active, if provided
e) Engine is shut down, and
f) Whenever transmission comes to neutral position inadvertently.

2.2 Warning Devices

2.2.1 All diesel equipments shall have an audio warning device of giving adequate audible warning signal and provided at suitable location conveniently near to the operator.

2.2.2 All equipments shall be fitted with suitable pre-start warning alarm. A mechanically operated device, like gong hammers, of giving adequately audible warning signal, in addition to any other type of horn, shall be provided.

2.2.3 All equipments shall be fitted with audio visual alarm (AVA). In case of coal mines, the AVA shall conform to DGMS Tech. Circular (Electrical) Approval No. 21, dated 05.10.2015 or its revised version.

2.2.4 A warning device shall be provided in the operator's cabin, to indicate when the rear dump body is elevated.

2.2.5 In case of lifting equipment, audio warning device shall be provided to give warning during lifting and lowering of platform.

2.3 Lighting

2.3.1 Efficient and suitable headlights capable of showing any obstruction in the roadway atleast upto 60m away from the equipment shall be provided.

2.3.2 A suitable cabin light shall be provided, so that all controls and instruments are visible to the operator.

2.3.3 A cap lamp shall be provided in the operator's cabin for emergency.

2.3.4 Equipment normally operated in both directions shall be equipped with headlights for both directions. The reversing lights shall get switched ON automatically when the equipment engages in reverse gear.

2.3.5 Red Retro- Reflective Reflectors shall be provided on four sides of the equipment at suitable positions.

2.4 Fire Suppression system

2.4.1 All Diesel operated equipment shall be provided with suitable type of Automatic Fire Detection and Suppression System conforming to DGMS (Approval) circular. No.02 of 2013 or its revised version.

2.4.2 The fire suppression system shall provide automatic fire detection and suppression for all the following parts of the equipment:

(a) The engine, transmission, hydraulic pumps and tanks, fuel tanks, exposed brake units, air compressors and battery areas, as applicable, on all diesel-powered equipment; and

(b) Fuel containers and electric panels or controls used during fuel transfer operations on fuel transportation units.

2.4.3 The fire suppression system shall include a fire alarm and system fault annunciator that can be seen and heard by the equipment operator.

2.4.4 The fire suppression system shall provide for automatic engine shutdown when the alarm alerts the operator. Engine shutdown and discharge of suppressant agent may be delayed for a maximum of fifteen seconds after the fire alarm annunciator alerts the operator.

2.4.5 Manual actuators: At least two manual actuators shall be provided with at least one manual actuator at each end of the equipment. If the equipment is provided with an operator's compartment, one of the manual actuators shall be located in the compartment within easy reach of the operator. For stationary equipment, the two manual actuators shall be located with at least one actuator on the stationary equipment and at least one actuator at a safe distance away from the equipment, and in air intake.

2.5 Control devices and instruments

Every equipment shall be provided with the following control devices and instruments including gauges for safe operation. The controls shall be arranged in the operator cabin so as to be within easy reach of the operator from his operating position.

2.5.1 Controls

a) Engine throttle control.
b) Engine start-stop control.
c) Forward-reverse control.
d) Brake controls including emergency brake.
e) Emergency stop function.

2.5.2 Instruments and gauges

a) Engine hour meter
b) Engine lube oil pressure gauge
c) Engine coolant temperature gauge
d) Fuel level indicator
e) Transmission oil temperature gauge
f) Transmission oil pressure gauge
g) Hydraulic oil temperature gauge
h) Exhaust outlet temperature gauge (for equipment used in coal mines)
i) Air pressure gauge for brake system, wherever applicable
j) Filter clog indictors for air and oils
k) Engine RPM meter
l) Audio-visual signals or panel lights for:

i. Low engine oil pressure
ii. Coolant temperature high

2.6 Electrical safety provisions

The following safety provisions shall be provided in all Diesel equipments:

2.6.1 All electrical components and accessories shall be Flame proof/Intrinsically safe or both conforming to relevant IS/ IEC standards for use in below ground coal mines.

2.6.2 Suitable Ingress Protection shall be provided to prevent ingress of dust and water/ moisture entering into the interior of the electrical apparatus.

2.6.3 The circuit voltage for remote control and electrical interlocking of apparatus shall not exceed 30 Volts.

2.6.4 Necessary protection against over-current and short circuit shall be provided in all electrical circuits/individual apparatus.

2.6.5 All cables shall comply to the provisions of the DGMS Tech. Circular (Electrical) No. 12, dated 25.05.2015 and corrigendum issued vide DGMS Tech. Circular (Electrical) Approval No. 01, dated 19.02.2016 in addition to the special requirement, if any, specifically for safe operation of the equipment or its revised version, for use in below ground coal mines.

2.6.6 Strapping of electrical harnesses to hydraulic and fuel lines is not permitted.

2.6.7 The battery shall be housed in a compartment that provides adequate clearance between the battery terminals and any lid. The cover provided over battery terminals shall be insulated underside. Battery compartments shall be properly ventilated and located so that it does not form part of an access pathway or platform during maintenance.

2.6.8 Equipment shall be provided with a clearly identified lockable isolation switch as close to the battery as practicable, which shall isolate the battery and shut down the engine when switched off as required under DGMS Circular No. 2 of 2017, dated 15.6.2017, issued on "Lock out and Tag out- energy shut down procedures".

2.6.9 To avoid risk of ignition due to electrostatic charge during use, maintenance or cleaning of the equipment, the selection of material and area of exposure shall be within the limits as per the relevant recommendations, such as ISO 10605:2008.

2.6.10 No part of the equipment/machine shall be made of light metals or its alloys which causes incendive sparking due to impact or friction.

2.7 Additional safety provisions for all tyre mounted equipments

2.7.1 Articulation safety lock shall be provided in articulated steering equipment. All articulated equipment shall be equipped with a safety bar or a device, which can readily be fitted without special tools, to prevent movement of the articulation joint during maintenance work in the vicinity of this joint.

2.7.2 Load locking valve/hose fail check valve shall be provided on all lifting cylinders to keep Bucket/dump body/lifting platform or any other lifted object stationary in the event of pressure loss of hydraulic oil. During maintenance underneath the extended cylinder, an additional mechanical locking device shall be provided.

2.7.3 There shall be provision for installing wheel chocks on the equipment.

2.7.4 Every equipment shall be provided with emergency steering, which can allow the operator to safely steer the equipment in case of emergency.

2.7.5 Towing arrangements of equipment:

a) The following arrangements shall be provided for towing of the equipment in case of the equipment is inoperable/breakdown:

i. a suitable rigid towing points on both sides, i.e. front and rear
ii. a means of releasing emergency brakes.
iii. a means of steering or guiding the equipment.

b) The equipment towing attachment including coupling pins and other associated components shall be designed and tested to a minimum factor of safety 3 (three) times the maximum tractive effort of the equipment.

2.7.6 Wheel rims shall be of heavy duty to operate equipment on the uneven load conditions, rough roads and corrosive environment present in mines.

2.7.7 Pressure check points shall be provided to measure brake system pressure in case of hydro-static braking.

2.7.8 Brake operation indication lights shall be provided at suitable locations.

2.8 Additional safety provisions for Personnel Carriers

2.8.1 Personnel carriers shall be equipped with emergency buzzer in the personnel compartment in order to warn the operator to stop the equipment in case of emergency. The buzzer shall give audible alarm in the operator cabin.

2.8.2 The Personnel carrier shall be provided with downhill, uphill, neutral and/or hydrostatic braking system.

2.8.3 Deadman's switch/device shall be provided in the operator's cabin to automatically shutdown the equipment, if the operator becomes incapacitated.

2.8.4 Steps, rungs, ladders, platforms and walkways shall be provided with non-slip surfaces, and shall minimize rock and soil retention. Hand holds shall be provided inside the compartment for personnel.

2.8.5 Personnel compartment shall have adequate ventilation and illumination.

2.8.6 Personnel carrier shall be provided with lockable gate.

2.8.7 Provision shall be made for transportation of an injured person on stretcher in all personnel carriers.

2.9 Additional safety provisions for Lifting Equipment

Every Lifting equipment shall have-

i) an emergency stop button on platform to quickly stop the motion of the mobile elevating platform
ii) supporting legs, wherever required
iii) railings and work platform gates with locking provision
iv) an additional mechanical locking device for work underneath elevated platform
v) load lock valve/check valves in all lifting cylinders
vi) limit switches for lifting and lowering of platform.

2.10 Additional safety provisions for Fuel bowsers

2.10.1 The Fuel bowser shall have approved license from Petroleum and Explosives Safety Organization (PESO), where ever applicable.

2.10.2 Fuel tank of the bowser shall be mounted on the chassis by means of fabricated M.S. saddles.

2.10.3 Fuel bowser compartment(s) shall be fitted with discharging faucet ending in a common manifold and heavy duty shut off valve located inside the tank, as per recommendations of PESO.

2.10.4 Opening lever of the valves of the bowser shall be housed in a control box at the rear part of the tanker with locking arrangement.

2.10.5 Top filling pipe of the bowser shall be drawn near to the bottom of the tank with spill proof device complete with leak proof connector with filling hose, and provided with suitable cap with chain.

2.10.6 Internal bulk heads of the bowser shall be stiffened to take care of surge pressure.

2.10.7 The bowser shall have filters with air eliminator for correct meter reading.

2.10.8 Tank of the bowser after completion of fabrication, shall be properly cleaned and treated with two coats of zinc chromate red oxide primer and finished with two coats of synthetic enamel paint.

2.11 Additional safety provisions for Explosive Carrier

2.11.1 Every Explosive Carrier shall have valid license from PESO.

2.11.2 The equipment shall not be used for transport of explosives unless it is in a fit condition and complies with the Explosives Rules, 2008.

2.11.3 All electrical wirings shall be protected with a conduit. An isolation switch for battery shall be located in an accessible position.

2.11.4 The equipment shall not be used for carrying passengers

2.11.5 Before the equipments are serviced, an authorized person shall inspect and certify that the equipments are free from explosive residues and the same shall be recorded in soft/hard copy and kept available at mine office.

2.12 Additional safety provisions for Explosive charging Equipment

2.12.1 Ammonium Nitrate Fuel Oil (ANFO) loading tanks shall be located so that they are not liable to potential impact damage from uncontrolled movement of the charging unit. Any spillage which may occur during loading does not fall onto any electrical connections, hot surfaces, flammable fluid tanks or filling points.

2.12.2 The hoses used for pumping of explosives shall be fire resistant and anti-static (FRAS).

2.12.3 Storage areas for packaged explosives shall be located so that they are not liable to be potential impact damaged from uncontrolled movement of the charging machine.

2.12.4 If an operator is required to work outside his compartment, the working point shall have-

(a) provisions for stopping and starting the engine.
(b) provisions for activating the fire suppression system.

2.13 Additional safety provisions for Diesel Locomotives

Diesel Locomotives shall conform to IS 9999:1981(Reaffirmed 2009) or its revised version along with DGMS - governing conditions for use of Diesel Locomotives in underground mines.

3.0 Construction and safety provisions of diesel engine to use in belowground mines

3.1. Design of the engine

The engine shall have following requirements-

3.1.1. good intake air cleaning system
3.1.2. fuel filtration system and water separators
3.1.3. well maintained engine cooling system
3.1.4. turbochargers and after coolers, if required
3.1.5. efficient high pressure fuel injection system
3.1.6. minimum engine emissions and Diesel Particulate Matter (DPM).

3.2. Engine Compartment

Engine compartment shall comply with the following:

3.2.1 The location of systems such as fuel, hydraulic oil, lubricating oil, other oils, and electric power within the engine compartment should be avoided wherever possible. It shall be shielded from hotspots and against possible damage. Fire wall or a barrier shall be installed to separate the engine compartment from the hydraulic components.

3.2.2 All hoses shall be fire resistant type and be routed away from hot engine surfaces. All pipes and hoses should be covered so that leaked oil cannot contact any exposed heated metal surface under any condition of equipment use. If this is not possible, the exposed metal surface shall be shrouded or heat shielded to reduce the temperature.

3.2.3 The transmission belts used in the diesel engine shall be fire resistant and anti-static (FRAS) type.

3.2.4 All engine exhaust systems shall be installed such that flames or glowing particles shall not be emitted from the engine compartment under any condition of equipment use.

3.2.5 The discharge from any engine breather shall be directed away from external surfaces of the engine system, so that it will not foul such surfaces with oil.

3.2.6 The temperature of any surface of the engine that comes into contact with the mine atmosphere shall not exceed 150°C under any condition of operation.

3.3. Cooling System

3.3.1. Every engine shall be provided with efficient cooling system.

3.3.2. Radiator caps provided for cooling systems shall be fitted with a means of safely relieving pressure to prevent scalding of personnel. Radiator caps shall be guarded against damage by foreign objects.

3.4. Fuel System

3.4.1. All fuel lines shall be heat resistant, corrosion resistant double braided hoses or metal pipes. All fuel lines shall be properly secured.

3.4.2. Fuel filter elements shall be enclosed within suitable containers.

3.4.3. All fuel tanks shall be substantially constructed and protected against damage by collision.

3.4.4. All fuel tanks shall be fitted with non-leaking caps which shall be effective irrespective of the inclination of the equipment and the caps shall be secured to the tank.

3.4.5. For high capacity equipment, diesel dispensing shall be of high volume diesel transfer facility, which includes fuel receiver with non-return valve, breather and other related accessories, to avoid spillage of fuel.

3.5. Engine protection system

3.5.1. The engine shall be equipped with suitable sensors to monitor and control engine performance, temperature and level of coolant and lube oil pressure, etc. When the sensor value differs from the preset parameter value limit, the engine protection system shall force the engine to decrease torque and warn the operator.

3.5.2. Every engine shall be provided with suitable sampling points for monitoring of engine lubricating oil pressure, engine speed, engine coolant temperature, inlet manifold vacuum, exhaust back-pressure and gas stream emissions both before and after exhaust treatment, temperature of emissions, etc.

3.6. Intake System

3.6.1. The location and installation of intake filter housings shall be situated away from heat sources (like exhaust) and dust sources (like tires).

3.6.2. Every underground diesel engine shall be equipped with a two-stage intake filter system.

3.6.3. Engine intake filter choke indicators shall be provided and located suitably for its easy monitoring by operator.

3.7. Exhaust System

3.7.1. (i) In case of coal mines, exhaust system shall consist of exhaust pipe from the exhaust manifold, exhaust conditioner, flametrap, spark arrester, exhaust cooling/dilution system and silencer. The exhaust system shall be provided with monitoring and shutdown devices.

(ii) In case of metalliferous mines, exhaust system shall consist of exhaust pipe from the exhaust manifold, exhaust conditioner, exhaust cooling/dilution system and silencer. The exhaust system shall be provided with monitoring and shutdown devices.

(iii) If any existing equipment is not having exhaust cooling/dilution system, within 12 months of issue of this standard, the equipment shall be incorporated with the exhaust cooling/dilution system.

3.7.2. The exhaust pipe shall be double walled construction to reduce exhaust surface temperature and manufactured with stainless steel to resist corrosion.

3.7.3. The exhaust conditioner/catalytic convertor shall be capable to dilute and render the exhaust gases harmless.

3.7.4. The final diluted exhaust gases shall be discharged in such a manner that they are directed away from the operator's compartment and also away from the breathing zones of persons.

3.7.5. The temperature of the cooled/diluted exhaust gases discharged in to atmosphere shall not exceed 85°C. In case of metalliferous mines, the temperature shall be measured at 1 m away from the discharge point.

3.8. Testing of Engines

3.8.1. Type testing of diesel engine shall be conducted by OEM at any Government approved test house or NABL accredited laboratory subject to confirmation of its ability to conduct such tests or International accredited laboratory/recognized laboratory of country of origin, conforming to BS-III emission norms of Construction Equipment Vehicles (CEV) or its revised versions issued by the Government of India from time to time or its equivalent standard of the country of origin. The test certificate of the same shall be kept available at mine office.

3.8.2. A specification plate shall be provided for each diesel engine system, permanently affixed either to the system or, if impracticable, adjacent to the system in an easily seen position. The specification plate shall include the following information:

a) Engine system protection rating
b) Designation and year of the standard followed
c) Name of the diesel engine system manufacturer
d) Date of manufacture of the diesel engine system
e) Serial number of the diesel engine system
f) Maximum compound, transverse and longitudinal angles of operation
g) Maximum concentrations of undiluted exhaust gas emissions measured during type testing.

3.8.3. The diesel engine system manufacturer shall supply the following documents to each purchaser alongwith consignment:

a) The general arrangement drawing
b) A letter of compliance for explosion protection and Standards followed- in case of coal mines.
c) Make and model of the engine
d) Serial number of the engine
e) Date of the routine assessment and the letter of compliance. A summary of results from routine testing, including gas testing.
f) Details of maintenance requirements, specifications and any other drawings/documentation necessary to maintain the diesel engine system in compliance with this Standard.

3.8.4. Wherever required, warning labels shall be fitted to each diesel engine system, at clearly visible locations, to identify major hazards that may cause injury to persons. Labels shall be permanently fixed and indelibly marked.

4.0 Additional construction and safety provisions for diesel engines used in underground coal mines and metalliferous mines in which Regulation 142 of Metalliferous Mines Regulations, 1961(or as amended from time to time) is applicable

4.1 Every diesel engine system used in underground coal mines shall be designed conforming to National standard (when formulated) or any internationally accepted standard for Explosion-protected diesel engine and shall be approved by Chief Inspector of Mines under Regulation 208(3) of Coal Mines Regulations, 2017 or as amended from time to time.

4.2 The diesel engine used in underground coal mines shall be Explosion-protected, i.e., designed, manufactured and maintained such that it will not propagate or generate flame or sparks, which could initiate an explosion of the surrounding inflammable atmosphere, if any.

4.3 The engine shall be compression ignition, diesel-fuelled and water-cooled type. It may be naturally aspirated, turbo-charged and/or super-charged. The diesel engine systems shall also be designed for a limited time safe operation in atmospheres containing up to 1% methane.

4.4 The equipment shall be fitted with at-least one automatic methane detector to detect the general body concentration of methane around the vehicle. The detector shall automatically activate a visual alarm to warn the operator when the concentration of methane exceeds 0.5% and shall shut off the engine when the concentration of methane exceeds 0.75%.

4.5 In case of such shutdown and if the equipment is required to be retrieved to a safe location, Manager shall frame suitable SOP for its retrieval.

4.6 All rotating components external to the engine (e.g., fan hubs, fan blades, pulleys) shall not be made of light metal and its alloys (which is incendive to sparking) and the use of non-metallic materials for external components of a diesel engine system shall be kept to a minimum (where such materials are used, they shall be shielded and routed away from heat sources). Cooling fans and rotating parts shall be guarded.

4.7 Air inlet systems shall be fitted with an inlet flametrap, an air filter assembly and an inlet manifold vacuum monitor.

4.8 The flametraps provided at the inlet and exhaust shall be capable of preventing the propagation of an explosion. Where a water-based flametrap is fitted, tests shall be conducted to ensure the engine exhaust system remains explosion protected at all angles of inclination during operation.

4.9 The ignition system of the diesel engine shall be of either pneumatic or hydraulic or any other explosion-protected system. The system shall be readily available all the times. A suitable standby portable type of such system shall be made available.

4.10 Compressors forming part of a diesel engine system shall be water cooled. Hoses that are attached to a compressor delivery port shall be of Poly tetra fluoro ethylene (PTFE) steel-wire reinforced braided construction or equivalent heat-resisting material. There shall be no valves between the un-loader and the compressor.

4.11 The following Safety shutdown systems for fail-to-safety, shall be provided:

i. Low oil pressure
ii. High coolant temperatures
iii. Loss of engine coolant
iv. Manual fuel shut-off
v. Exhaust gas temperature
vi. Low-water level device
vii. Sensing device for a fume dilution system
viii. Spark arrestor sensing device
ix. Device to ensure the safe operation of a particulate filter, and
x. Emergency stop system.

In case of shut down of the engine due to any of the above safety shutdown systems, the engine shall not be able to be restarted until the fault is rectified, except for the allowed automatic override features, like, low oil pressure and low coolant pressure. Where the automatic override is provided, period of override shall not exceed the engine manufacturer's specifications.

4.12 Warning labels shall not be manufactured from light metal and its alloys (which is incendive to sparking).

4.13 Undiluted exhaust gas emissions of equipment after treatment shall not contain more than—

(a) 0.010% (100 PPM) by volume of NO_2;
(b) 0.09% (900 PPM) by volume of NO;
(c) 0.11% (1100 PPM) by volume of CO; and
(d) 0.20% (2000 PPM) by volume of CO, while 1% CH_4 is injected into the intake.

5.0 Specifications of diesel fuel and lubricants

Diesel fuel of proper quality shall be used for satisfactory engine performance, longevity of the engine and acceptable exhaust emission levels.

5.1 Quality of diesel fuel

5.1.1 Specifications of diesel fuel used in the diesel equipments shall conform to Bharat Stage III- Construction Equipment Vehicular Emissions Norms or its revised versions issued by the Government of India from time to time.

5.1.2 The supplier of the fuel oil shall certify in writing that the diesel fuel supplied by him meets the requirements mentioned under Para 5.1.1 above and shall provide a copy of the certificate to the user with every consignment.

5.1.3 User shall ensure that the diesel fuel received at the mine is free from water content. Before using the diesel fuel in the equipments, user shall ensure that the diesel fuel conforms to the above mentioned standards and obtain certificate from the supplier to this effect.

5.1.4 The user and supplier shall jointly collect the samples of the fuel oil once atleast in every three months and get it tested at any Govt. approved or NABL accredited laboratory. The fuel oil shall not be used unless it meets the requirements of above mentioned standards/norms.

5.2 All the lubricants used in the diesel equipment shall conform to relevant National/International standards.

6.0 Emission Pollutants and Limitations

6.1 Permissible Limits of Diesel Particulate Matter (DPM)

The owner, agent and manager of every mine shall take such steps as necessary for minimising emission of Diesel Particulate Matter (DPM) from the exhaust of every diesel equipment and for the dispersal and dilution of DPM which enters the mine air at any work place belowground and for ensuring exposure of workers to DPM limited to an extent that is reasonably practicable but in any case not exceeding the limits prescribed below :

a) A miner's personal exposure to Diesel Particulate Matter (DPM) in an underground mine shall not exceed an eight-hour time weighted average (TWA) airborne concentration of 100 micrograms of Elemental Carbon per cubic meter of air ($100_{EC}\mu g/m^3$).

Provided that the allowable limit of TWA of EC in DPM may be $120_{EC}\mu g/m^3$ for a period of one year from the date of coming into force of this standard.

b) The airborne concentration of DPM shall not exceed 3 times the TWA value (i.e. 300ECμg/m3) for more than 30 minutes and shall never exceed 5 times the TWA value (ie, 500ECμg/m 3) at any place in an underground mine.

6.2 Monitoring of Diesel Particulate Matter (DPM)

6.2.1 The owner, agent or manger of every mine shall once at least in every three months or whenever the Regional Inspector so requires by an order in writing, monitor full-shift personal exposure of all workers exposed to diesel particulate matter(DPM), under actual mining conditions:

provided that, if any measurement of DPM shows concentration in excess of fifty percent or seventy five percent of the allowable concentration as specified in Para 6.1 above, the subsequent measurements shall be carried on at intervals not exceeding one month or fifteen days respectively:

provided further that, such measurements shall also be carried on immediately upon the commissioning of equipment or machinery or upon any major alteration in ventilation that is likely to bring about any substantial change in the level of DPM.

6.2.2 The DPM shall be measured by a person authorised for the purpose with a suitable instrument capable of measuring concentrations of elemental carbon (EC) in near real-time, which replicates NIOSH 5040 or equivalent or by collection of samples and the samples shall be analysed at any Govt. approved or NABL accredited laboratory following a procedure equivalent to NIOSH 5040. The samples drawn shall as far as practicable be representative of the levels of DPM exposure of work-persons.

6.2.3 When the DPM monitoring results have established that the permissible limit of EC concentrations being exceeded at any place, immediate steps shall be taken to minimize the emission of DPM and to notify the Regional Inspector. If however, the average concentration of DPM in a series of 2 samples in successive working shifts exceeds the "permissible limits" the relevant operation causing excessive DPM shall cease. The operation(s) shall not be resumed until improvements have been made in the generation and dilution/removal of DPM and fresh sampling carried out immediately on resumption of the said operation(s) has established that such improvements have reduced the DPM concentration below the "permissible limit".

6.2.4 The measurements shall be recorded and maintained in the form of soft copy or a register kept for the purpose, signed and dated by the person taking measurements and counter signed by the Manager.

7.0 Ventilation requirements

7.1 No diesel equipment shall be operated in any working place :

i. where the velocity of air current is less than 45 m/min,

ii. where presence of inflammable gas in the general body of air at any place exceeds 0.1% in case of I degree gassy coal mines and any metalliferous mine in which

Regulation 142 of Metalliferous Mines Regulations, 1961 is applicable or 0.75% in case of II and III degree gassy coal mines,

iii. whenever the ventilation therein interrupted for any reason whatsoever,

iv. where the concentration of any noxious gas at any point in the roadway exceeds the concentration specified in the table below:

Sl. No.	G a s	Maximum Allowable concentration	
		Percentage (%) by volume	PPM
1	Carbon Dioxide	0.5	5,000
2	Carbon Monoxide	0.005	50
3	Nitric Oxide (NO)	0.0025	25
4	Nitrogen Dioxide (NO_2)	0.0005	5
6	Sulphur dioxide (SO_2)	0.0005	5
7	Hydrogen sulphide (H_2S)	0.0005	5
8	Aldehydes	0.001	10

v. where wet bulb temperature at any place therein exceeds 33.5^{0}C:
provided that, if the wet bulb temperature at any place in the roadway exceeds 30.5^{0}C, arrangements are made to ventilate the same with a current of air moving at a speed of not less than 1 meter per second.

7.2 Owner, Agent or Manager of the mine shall ensure that there shall be adequate quantity of air in each working place in which a diesel equipment is operated, to dilute the engine exhaust gases to the lowest practicable levels, and this volume flow shall not in any case be less than the minimum quantity of air specified in this standard.

7.3 Additional quantity of air required for each diesel equipment shall not be less than 0.06 cubic meters per second per kilowatt of the maximum rated engine output specified by the manufacturer.

7.4 If more than one diesel equipment is operated in any ventilation circuit of a mine at the same time, the total quantity of air in that circuit shall not be less than the aggregate of the volume requirement for the individual diesel units:

Provided that while calculating the aggregate volume requirement in any given ventilation circuit, light four wheel vehicles and other diesel units of small engine capacity which are operated intermittently may be disregarded.

7.5 Examination of roadways for adequacy of Ventilation

7.5.1 (a) At least once in every shift during the diesel equipments are in normal operation, the atmosphere of the roadways, in which the equipments are operated, shall be tested for the presence of the noxious and inflammable gasses. The tests for noxious gasses shall be carried out in the roadways approximately at 1.5 m above the floor level and 1 m from the diesel equipment exhaust on the return side.

(b) Such tests shall also be done in the roadways at following places;
i. At each end of the roadway, or part thereof, in which equipments are operated; and
ii. At other points, as may be fixed by the manager.

7.5.2 The above measurements shall also be taken whenever any alteration is made in the quantity of air circulating in the roadway or part thereof.

7.5.3 The measurements shall be recorded and maintained in the form of soft copy or a register kept for the purpose, signed and dated by the person taking measurements and counter signed by the Manager.

7.5.4 During any such examination, if the percentage of inflammable or the noxious gasses are found more than the limits specified above, the person making the inspection, shall immediately report the fact to the official in charge of the district, who after confirming the presence of the gas as above, shall discontinue the use of any diesel equipment in that roadway. After the said discontinuance, no equipment shall be re-operated in the roadway unless the manager, after satisfying himself and certifying in writing that the content of gas in the roadway or part thereof has been reduced below the specified limits.

7.5.5 Every such discontinuance shall be recorded in the form of soft copy or a register kept for the purpose and signed and dated by the Manager.

7.5.6 During any such examination, if the concentration of the noxious and inflammable gasses in general body of air, is found to be more than prescribed limits, immediate steps shall be taken to dilute the said concentration below the said limits.

7.5.7 In II and III degree gassy coal mines, presence of inflammable gas in the general body of air shall be monitored continuously with suitable systems and the diesel equipment operating therein shall be shut down by the systems automatically or give audio-visual warning in the event of concentration of the gas exceeds the prescribed limits.

7.6 Air Sampling

7.6.1 Once at least in every week, samples of the general body of air shall be taken-

i. at a point at the end of every road in which any diesel equipment is operated;
ii. at such other suitable points as may be fixed by the manager;
iii. at any place and time, as may be specified by Regional Inspector.

7.6.2 Every sample, taken as above, shall be analysed, within three (3) days of taking thereof (without taking into account any rest day or day of general holiday) to determine the percentage of noxious and inflammable gasses therein. Particulars of every such analysis shall be recorded in the form of soft copy or a register kept for the purpose.

8.0 Safe operation of diesel equipment

8.1 Transport Rules

8.1.1 Transport rules shall be framed with regard to the operation of diesel equipment in the mines. The transport rules, inter alia, shall contain:

i) Code of safe practices and standard operating procedures of the diesel equipments used in the mine.
ii) The minimum required width and height of the roadways in the mine in which the equipments may be operated.
iii) The permissible maximum load to be carried by the equipments.
iv) The areas in the mine, in which speed restrictions on equipment shall apply.
v) The roadways, in which person to be transported and the material to be carried and the type of the equipments to be used for the purpose, etc.
vi) Traffic rules of the equipments.

8.1.2 Copies of the Transport Rules shall be circulated to all operators of the equipments, concerned supervisors and officers of the mine. The traffic rules, permissible maximum load and speed of the equipments shall be posted at all conspicuous places along the route, in which the equipment is operated, transfer/ loading points, garage, charging stations and miners' station.

8.2 Operation of diesel equipment

8.2.1 No equipment shall be operated, except for repairs and test, otherwise than by a person who has been authorized by manager to be driver/ operator of the equipment. Provided that, he shall be,-

a) Trained (preferably by OEM) and certified to be competent in the operation of type of equipment in question.

b) provided with full instructions in writing with regard to the permissible haul roads and speed as per transport rules, and

c) familiar with all precautions necessary for safe operation of the equipment.

8.2.2 Even during the repairs or tests, the equipment shall not be operated, except by a competent person, authorized for the purpose.

8.2.3 Starting system of every diesel equipment shall have a suitable locking provision and its key shall always be under the charge of the operator or any authorized person.

8.2.4 At the commencement of every shift, the operator of every diesel equipment shall personally carry out necessary pre-start examinations paying special attentions to brakes, steering, accelerator, warning devices, lights, etc. to ensure that it is in safe working order.

8.2.5 If any fault is found in the equipment during the above examinations or during its operations/or otherwise, and also, in the event of any irregularity in the running or sound of the engine in particular, any excessive emission of smoke, any open sparking, any stoppage in the circulation of water or any leakage of fuel, the equipment shall be immediately be taken out of service and the same shall be brought to the notice of shift supervisor/officer, and the equipment shall not be put in further use unless it is attended and the fault is rectified to satisfactorily.

8.2.6 The result of every such examination, and also of every action taken to rectify the faults or irregularities noticed in the equipments shall be maintained in a soft copy or record kept for the purpose.

8.2.7 The engine of a equipment shall not be kept running, when the equipment is stationary except,-
a) during starting,
b) during brief halts,
c) while being tested.

8.2.8 Any material being transported in a trolley/trailer shall be securely tied to it so that there is no danger of the falling of material.

8.2.9 Unless authorized in writing, no person, other than the driver/operator shall be transported in any diesel equipment, trolley, or trailer attached thereto other than a equipment or a carriage duly approved for man-riding.

8.2.10 No person shall be allowed to ride over and work on an elevated bucket or any other part of equipment.

8.3 Training

8.3.1 Before engaging any person on maintenance, repairs, examinations, tests and operation of diesel powered equipment in the mine, he shall be trained, tested and certified to be competent by OEM and authorised by the Manager for the purpose.

8.3.2 The training shall be carried out by OEM or authorised instructor(s) on topics related to safe operations, maintenance of fire-protected and explosion-protected diesel engine systems and gas testing.

8.3.3 Similarly, mine workers conducting ventilation related sampling and measurements shall also be trained on related topics.

8.3.4 Mine management shall provide refresher training annually to all miners who can reasonably be expected to be exposed to the diesel emissions. The training shall cover the health risks associated with exposure to DPM as well as the methods used in the mine to control DPM concentration and procedures for changing and disposal of DPM filters provided in equipment.

8.3.5 Training on the following topics shall also be imparted to the concerned persons in the mines:

a) DPM filters and cleaning of DPM filters, measurement and control of DPM.

b) Use of PPE

c) Mine environmental monitoring systems and sensors of different gas monitors/detectors.

d) Engine fundamentals, which shall include an introduction to the function of a diesel engine and recognition of all major components and their functions;

e) Diesel emissions, which shall include an introduction to diesel emissions and their adverse health effects;

f) Factors that affect diesel emissions, which shall include a detailed presentation of engine faults and diesel fuel quality, and their effects on emissions, as well as instruction in the preventive actions that can be taken to minimize emissions levels;

g) Emissions control devices, which shall include a detailed presentation of the different emissions control devices employed to reduce emissions, and details about actions the equipment operator must take to keep the devices in working order;

h) Diagnostic techniques, which shall include a presentation of techniques that can be employed by the equipment operator to assure the equipment is in safe operating condition, and instruction in how to recognize and diagnose certain engine faults that may cause increases in emissions;

i) The preoperational inspection, which shall include a presentation of the purpose, benefits, and requirements of the preoperational inspection;

j) Ventilation, which shall include an introduction to special ventilation requirements for areas of the mine in which diesel-powered equipment will operate;

k) Fire suppression systems, which shall include an introduction to the use and function of fire suppression systems, and when and how to manually activate a fire suppression system;

l) Safe Operating procedures, which shall include a detailed presentation of the driving rules, safe driving speeds, traffic control devices, and equipment limitations and transport rules.

m) Emergency procedures, which shall include discussion of emergency situations such as fire, diesel fuel spills, component failure, and loss of ventilation air. This instruction shall also include emergency escape procedures and discussion of the potential use of the diesel-powered vehicle as an emergency escape vehicle in case of a mine emergency situation; and

n) Record keeping and reporting procedures, which shall include a presentation on required record keeping and reporting procedures for problems or unsafe conditions, high emissions levels, and preoperational inspections made by the equipment operator.

8.3.6 Certificate of qualification: The mine management shall issue to the equipment operator a new certificate of qualification once in every two years on successful completion of training and assessment. The mine management shall keep at the mine site a copy of the most recent certificate of qualification issued and make it available for inspection by Chief Inspector of Mines or any Inspector of Mines.

9.0 Roadways for Diesel equipments

9.1 Construction and Safety provisions of Road ways

9.1.1 So far as reasonably practicable, the floor of every roadway, in which any diesel equipment ply, shall be kept even, firm, free from debris/mud, water and not conducive to skidding.

9.1.2 Unless exempted in this behalf in writing by the Chief Inspector of Mines/Regional Inspector, track less equipment shall not be operated on any length of roadway of which gradient exceeds 1 in 6 and for track (rail) mounted, the gradient shall not exceed 1 in 15.

9.1.3 Floor of roadways should be designed to bear the maximum ground pressure exerted by the heaviest equipment that ply on the roadway.

9.1.4 Proper drains shall be constructed along the sides of the roadways so as to keep the floor of the roadway free from water.

9.1.5 Man holes shall be provided at intervals of not more than 20 meters on the side of the roadway.

9.1.6 All the roadways in which diesel equipments ply shall be adequately illuminated.

9.1.7 Reflective warning notices and sign boards shall be posted along the roadways at appropriate places, like level crossings, steep gradients, curves and junctions.

9.1.8 No person shall be allowed to walk/present in the roadways while the equipments are plying in it.

9.2 Clearances from roof and sides

9.2.1 No equipment shall ply in any roadway, where the clear space from roof is less than 300 mm, if the equipment is provided with a canopy/ closed cabin for the operator, or in any other cases, not less than 1.8 m from the footboard of operator.

9.2.2 Every roadway, in which only one equipment ply, an unobstructed space of not less than 1.5 m, in addition to the width of the equipment, shall be provided along the width of the roadway.

9.2.3 In every roadway, in which more than one equipment ply, crossing points shall be provided at intervals not exceeding 300 m. At every such crossing point, a clear space of not less than 1.5 m along the width shall be provided after allowing clearance for safe crossing of two equipments.

9.2.4 Radius of curves and clearances at the junctions of the roadways shall not be less than the minimum required for turning the equipment as recommended by the manufacturer, otherwise the radius of curve shall provide a clear space of not less than 1.5 m over the minimum turning radius required by the equipment.

9.2.5 The roadways shall be adequately supported to prevent any roof and side falls.

9.3 Examination of Roadways

9.3.1 Every roadway, in which any diesel equipment is operated, shall be placed under sole charge of a competent person, who shall once at least in every 24 hours, examine every such roadway with regard to,-

a. clearance and free from obstruction
b. condition of its roof and sides
c. ventilation
d. illumination level in roadways
e. presence of coal dust in case of coal mines
f. condition of track in case of locomotives, monorails, etc.
g. general safety.

9.3.2 The competent person, making the above examinations shall record the results thereof in a soft form or in a record kept for the purpose, signed and dated by him and counter signed by manager.

10.0 Maintenance and Testing

10.1 Suitable maintenance schedules and activity wise SOP's shall be framed and implemented for every diesel equipment by considering the OEM recommendations.

10.2 All the repairs, scheduled maintenances and testing shall be carried out by competent person(s) under the supervision of an authorized supervisor/engineer.

10.3 Procedures and schedules for inspection, maintenance and testing of all fire suppression systems shall be framed and implemented.

10.4 Nitrogen charging in accumulators and suspensions shall be carried out as per the DGMS Technical circular no. 02 of 2012 or its revised version.

10.5 **Brake testing**

10.5.1 Once at least in every seven (7) days, and also immediately after any repairs or adjustments have been carried out on it, the braking system of every equipment shall be examined and tested by a competent person conforming to ISO-3450:2011 or its revised version or any internationally accepted standard.

10.5.2 Every person, making any inspection, examination or test, as above, shall forthwith record the particulars thereof in the Test report as per Clause no 7.0 of ISO

3450:2011 or its revised version or any internationally accepted standard and shall sign and date the same.

10.5.3 The test shall be conducted as under:

(a) Deceleration Test: When the Diesel Equipment, is in a loaded condition,

(i) By direct mechanical action and

(ii) By every other means provided

Explanation: The declaration test shall be carried out as follows:

Apply the service brake as the diesel equipment with load passes a marked point at a selected speed, the distance travelled in coming to rest should be measured and recorded. The maximum permissible distance shall be obtained from the manufacturer conforming to the standard. While seeking this information of normal trailing load and gradient should be furnished to the manufacturer.

(b) Stand still tests (Parking Brake)

Explanation: The Stand still test shall be carried out as follows:

When the Diesel Equipment is in loaded condition on maximum gradient and its diesel engine is stopped with applied parking brake of any means provided other than direct mechanical action, the equipment shall be stationary (no creep) for the period of at least 10 minutes.

10.6 Testing of steering function and emergency steering function shall be carried out fortnightly and a record thereof shall be maintained.

10.7 Non-destructive testing of all the load carrying members of the equipments, where safety of the persons is involved, and whole body vibrations study shall be conducted for operator comfort, once in every one year conforming to any internationally accepted standards, from any Govt. approved test house or NABL accredited laboratory subject to confirmation of its ability to conduct such tests.

10.8 Noise survey shall be conducted conforming to the DGMS circulars No. 18 of 1975 and 5 of 1990 or its revised version and accordingly suitable action shall be taken to reduce the equipment noise.

10.9 Inspection and testing of all pressure vessels shall be conducted once in every three years conforming to DGMS circular no. 7 of 2003 or its revised version.

10.10 Engine blow-bye measurement shall be conducted as per the recommendations of OEM.

10.11 Oil sample condition based monitoring (CBM) shall be conducted as per the recommendations of OEM at any Govt. approved Test house or NABL accredited laboratory subject to confirmation of its ability to conduct such tests.

10.12 Undiluted exhaust gas monitoring shall be carried-out once atleast in every month conforming to the prescribed values and accordingly preventive maintenance is to be carried-out.

10.13 Proper protection equipment shall be used to avoid flying of rim accessories. Person(s) shall be kept away from lifting object trajectory while inflating the tyres. Precautions shall be taken during tyre inflation conforming to DGMS circular Tech. 9 of 1979 or its revised version.

10.14 The competent person(s) making the inspection/examination, maintenance and testing aforesaid shall record the results thereof in a soft form or register kept for the purpose, signed and dated by him and counter signed by manager.

10.15 All sensors of the diesel engine system shall be regularly tested and routinely calibrated/replaced to ensure correct operation as per the recommendations of OEM.

10.16 All electrical items associated with the equipment shall be checked by a competent person authorized for the purpose and the observations shall be recorded daily in a register kept for the purpose or in electronic form with due authentication.

10.17 **Additional conditions for Maintenance and Testing of Diesel engines used in underground coal mines and metalliferous mines in which Regulation 142 of Metalliferous Mines Regulations, 1961(or as amended from time to time) is applicable**

Apart from the above mentioned maintenance and testing procedures, the following conditions for maintenance and testing of diesel engine systems used in underground coal mines and metalliferous mines in which Regulation 142 of Metalliferous Mines Regulations, 1961 or as amended from time to time, is applicable, shall be carried out to ensure diesel engine systems remain explosion-protected or fire-protected condition over their life cycle.

10.17.1 A safety file (History record) for each Diesel Engine system mentioning its serial number and details shall be initiated by the manufacturer and every maintenance activity shall be recorded and maintained by the user. These safety files shall be kept available at mine office.

10.17.2 Hydrostatic testing of all explosion-protected components, testing of shutdown systems and calibration of sensors (other than methane sensors) of the diesel engine, shall be conducted once in every two years conforming to the National standard (when formulated) or AS/NZS 3584.3: 2012 (or its revised version) or internationally accepted standard, at any Govt. approved Test house or NABL accredited laboratory subject to confirmation of its ability to conduct such tests and record thereof shall be kept available at mine office.

10.17.3 The service facility in the mine shall be provided with required tools and tackles along with the following measuring apparatus to maintain the fire-protection and explosion-protection properties of the Diesel engine system:

(i) Straightedges
(ii) Feeler gauges
(iii) Thread gauges
(iv) Inside and outside micrometers
(v) Dial gauges
(vi) Depth gauges
(vii) Callipers, inside and outside
(viii) Surface roughness/finish instrument
(ix) Diesel engine tachometer
(x) Injection timing instrument
(xi) Surface temperature thermometer
(xii) Coolant temperature thermometer
(xiii) Exhaust temperature thermometer
(xiv) Manometer—exhaust back-pressure
(xv) Manometer—inlet vacuum

(xvi) Gauges—lube oil pressure and temperature
(xvii) Hydrostatic test set with calibrated pressure gauge
(xviii) Barometer—atmospheric pressure
(xix) Psycho meter—relative humidity
(xx) Analysers to measure gaseous emissions and diesel particulate matter (smoke)
(xxi) Torque wrenches.

10.17.4 Methane sensor(s) provided on the equipment shall be calibrated and tested for its efficacy with suitable testing kit conforming to DGMS (Tech) circular no.09 of 2002 at any Govt. approved Test house or NABL accredited laboratory subject to confirmation of its ability to conduct such tests.

10.17.5 (a) A person authorized for the purpose shall ensure that the undiluted exhaust gases produced, under all standard conditions of engine speed or load, by the engine of a diesel equipment in underground mine is sampled and analysed —

(i) at intervals of not more than 500 hours as measured by the diesel unit hour meter, or at intervals not exceeding three months if the unit does not have an hour meter;

(ii) after any maintenance work is done on the turbocharger or fuel injection system on the engine of a diesel unit (other than cleaning or replacing filters); and

(iii) when required to do so by an Inspector.

(b) The samples shall be tested at any government approved Test house or NABL accredited laboratory. These reports shall be kept available in the mine office.

(c) The manager of an underground mine shall ensure that if sampling of undiluted exhaust gases from engine of a diesel equipment shows the content of contain carbon monoxide or oxides of nitrogen is more than the quantities prescribed in para 4.13 of this standard, the diesel equipment shall not be returned to service until the exhaust emissions are reduced to levels below those specified and as low as is practicable.

11.0 Precautions while transportation, storage and filling of fuel in underground mines

11.1 **Filling station**

11.1.1 No equipment shall be re-filled with fuel oil, except at a filling station authorized by the manager.

11.1.2 Underground diesel fuel storage facilities in the filling station shall meet the following general requirements:

a) Permanently affixed underground diesel fuel storage tanks are prohibited;
b) The fuel oil shall be stored in a suitable mechanically strong/leak proof, spill proof and non-flammable tank and kept in the filling station and,
c) The stock of fuel oil stored in underground shall at no time exceed the consumption of the equipments over a period of 48 hours or maximum 1800 litres, whichever is minimum.

11.2 **Location:** An underground diesel fuel filling station shall be located:-

a) At least 50m away from shafts, inclines/declines, haulage roadways, maintenance workshops and reserve stations;
b) At least 15 m away from trolley wires, haulage ways, power cables and electric equipment not necessary for the operation of the storage and filling facility; and
c) In an area that is as dry as practicable.

11.3 **Construction**: Construction of an underground diesel fuel storage facility in the filling station shall be:

a) mechanically strong, leak-proof, spill proof and constructed of non-combustible materials;

b) ventilated directly into the return air course using non-combustible materials;

c) equipped with an automatic fire suppression system that complies with DGMS general order for the fuel storage tanks, containers, safety cans, pumps, electrical panels and control equipment in fuel storage areas.

d) Maintained with adequate stock of dry sand/lime stone dust for extinguishing fire;

e) Marked with conspicuous signs designating as combustible liquid storage.

f) Audible and visual alarms to warn of fire shall be provided at the protected area and at a surface location that is always staffed when persons are in underground. A means shall also be provided for warning all endangered persons in the event of fire.

g) Manual actuators: Fire suppression systems shall include two manual actuators with at least one located within the fuel storage facility and at least one located a safe distance away from the storage facility and in intake air.

h) The fire suppression system shall remain operative in the event of electrical system failure.

i) Monitoring of system: If it is electrically operated, the system's detection and actuation circuits shall be monitored and provided with status indicators showing power and circuit continuity. If not electrically operated, the system shall be provided with a means to indicate the functional readiness status of the system.

j) Weekly visual inspection. Each fire suppression device shall be visually inspected at least once every week by a person authorised for the purpose.

k) Maintenance, testing and record keeping: Each fire suppression device shall be maintained and tested in accordance with the provisions of this standard. Maintenance, testing and inspections of the device shall be recorded in the register kept for the purpose or in soft form.

11.4 Transportation of diesel oil

11.4.1 Diesel fuel shall be transported only in containers specifically designed for the transport of diesel fuel. Any container, other than a safety can, shall be permanently fixed to the transportation unit. The container shall be provided with a device for venting & self-closing cap and shall not exceed a capacity of 1800 liters. Two fire extinguishers shall be provided at each end of the transportation unit. Empty containers shall be returned to the surface as promptly as possible.

11.4.2 No person shall transfer fuel to a diesel engine, except by means of a pump and hose. Safety cans shall be used only for emergency fuelling. Safety can shall be clearly marked, have a maximum capacity of 18 liters, be constructed of metal, and equipped with a nozzle and self-closing valves.

11.4.3 While transferring fuel from one container to another or from a container to a equipment, care shall be taken to prevent spillage, and any fuel, if slipped, shall forthwith be removed by means of a suitable non-inflammable absorbent. All oily and greasy waste shall forth with be deposited in a closed incombustible receptacle, and removed from the mine as soon as possible.

11.4.4 Re-fuelling of any equipment shall not be carried on, and fuel oil shall not be transferred from any container, or handled, while any internal combustion engine is running inside the filling station, or within a radius of 15m thereof.

11.5 **General Safety Requirements**

11.5.1 The silled floor of the filling station shall drain into a covered sump or sufficient size to hold 1 ½ times the maximum quantity of the fuel and lubricant stored.

11.5.2 No person shall smoke, or use any light or lamp, other than a locked safety lamp, or an electric lamp, adequately protected, in any filing station, or within a radius of 15m of any filling station.

11.5.3 No person shall service any equipment in a filling station.

11.5.4 Welding or cutting shall not be done within 15 m of an underground diesel fuel storage facility. Cutting or welding shall not be performed on or within containers or tanks that have contained combustible or flammable materials until such containers or tanks have been thoroughly purged, cleaned or inerted, and a vent or opening is provided to allow for sufficient release of any built-up pressure before heat is applied.

11.5.5 Diesel fuel shall not be transferred to the fuel tank of diesel-powered equipment while the equipment's engine is running.

11.5.6 Safe Operating Procedures shall be framed and kept posted in the form of a notice, clearly visible, in every filling station.

12.0 General Conditions

12.1 Fire resistant high pressure hydraulic hoses with its end fittings used in mines shall conform to DGMS gen. order No.DGMS/Mech/Tech.Cir.(Approval) No.04, dated 13.02.2015 or its revised version.

12.2 In case of coal mines, fire resistant hydraulic fluid shall conform to DGMS gen. order No.DGMS/Mech/Tech.Cir.(Approval) No.02, dated 13.02.2015 or its revised version.

12.3 Adequate number of competent persons including Fitter, auto-electrician, operator, supervisors and Engineers (Electrical, Mechanical & Mining) etc. shall be appointed in mine to take care of installation, maintenance, testing and safe operation of diesel equipment.

12.4 An engineer shall be authorized exclusively to hold charge of Diesel engine system, and to be responsible for its installation, maintenance and safe working.

12.5 All circulars/General approvals issued by DGMS from time to time, relevant to the equipment shall be complied with.

12.6 Chief Inspector of Mines may by an order in writing and subject to such conditions as may be specified therein require any modifications or additional requirements to be included in this standard on merit of the case.

13.08.18

(Prasanta Kumar Sarkar)
Director General of mines Safety

Articles

CAUSES OF ELECTRICAL ACCIDENTS IN THE MINES SINCE LAST 10 YEARS

1. **Cause:** While a helper was trying to fix cover bolts of incoming chamber of live 3.3KV VCB during maintenance work in an underground coal mine, a flashover occurred resulting in serious burn injuries to his both forearms.

2. **Cause**: While a Helper touched the frame of motor-pump set feeding water to the Granite cutting operation, received electrical shock which turned fatal on way to Hospital.

3. **Cause**: While maintenance work on 3.3KV VCB was being done, two successive flashovers occurred in the VCB within a span of 10 minutes resulting in serious burn injuries to five persons including Electrician, who subsequently succumbed to burn injuries during treatment at Hospital after 10 days.

4. **Cause**: - While a person handling a cable in an underground coal mine which was remain charged electrically, came in contact with its live conductor(s), he received electric shock resulting burn injuries on his right hand palm including the nail of his ring finger got scraped.

5. **Cause**: - While a person climbed up with the help of a ladder resting on the post of a 220V overhead line in order to make connection, he received electric shock and fell down from a height of about 2.5 – 3m and sustained bodily injuries.

6. **Cause**: While a helper (employed by contractor) was attempting to shift welding machine at civil construction site for project expansion of the mine, has received electric shock due to failure of insulation in {a temporary splice connection which was energized} temporary joint in 415V supply cable near to the frame of welding machine, to which he succumbed on the way to hospital.

7. **Cause**: - While an outsider attempted to cut unknowingly with an axe a live conductor of 3.3 KV originating from a transformer he instantly died due to electrocution.

8. **Cause**: While a person was priming 5HP pump in a quarry bed of an opencast granite mine, he received electric shock due to defective cable lying in water which proved fatal on the way to hospital.

9. **Cause:-** While a Contractor worker was raising the mast of a drill rig parked under a 33 KV overhead line it came in contact with the overhead line causing severe burn injuries to his person.

10. **Cause:-** While the body of a water tanker was being raised under an 11 KV overhead line, to empty left out water, it came in contact with the overhead line and the Helper operating the wheel valve received electric shock and died.

11. **Cause: -** While a contractor's semi-skilled labour working as electrical helper was cleaning the 11KV live coupler fitted at outgoing isolator of four unit kiosk for fixing the blanking cover, his right hand first finger came in contact with socket resulting in a huge flash causing burn injuries and electrocution to him.

12. **Cause: -** While an electrician was working at outgoing of the 3.3KV VCB, inadvertently 3.3KV power supply was put ON by another electrician who was working on the same switchgear, came in contact with live conductor resulting in a huge flash causing burn injuries and electrocution to him.

13. **Cause: -** While a drilling crew of five Coal Cutters were drilling holes in stone roof using coal drill machine, the body of the coal drill machine got electrically charged due to failure of its insulation resulting in electrocution of one and electric shock to three others.

14. **Cause:-** While an Electrical supervisor was trying to disconnect the power leads of a 230V light fitting installed nearby to 440V live overhead line conductor on the same support and for which no shutdown was obtained, his left hand fore finger inadvertently came in contact with the live conductor and got electrocuted.

15. **Cause:-** While an Electrician was trying to measure the voltage in the bus-bar of switchgear in live condition one of removed bolts fell in between bus bar terminals resulting in a huge flash causing burn injuries to both the palms.

16. **Cause: -** While an Electrician was trying to connect the power leads to a motor operated by a defective direct online starter, the contactor unit of the starter closed and two of the power leads at the motor end came in contact resulting in a huge flash causing burn injuries to him.

17. **Cause:-** "While an Electrician Trainee was deputed to bring a missing tool from a site where he had not worked, he unknowingly opened the live 3.3 KV bus bar, came in its contact and got electrocuted.

18. **Cause: -** While a contractor's unskilled labour lifting the trailing cable coupler, the projected coupler pin which got stuck up in the coupler came to closer to his wet shirt

resulting in a flash due to corona effect and shirt got burnt causing burn injuries at lower abdomen to him.

19. **Cause**: While maintenance work on 3.3KV VCB was being done, two successive flashovers occurred in the VCB within a span of 10 minutes resulting in serious burn injuries to five persons including Electrician, who subsequently succumbed to burn injuries during treatment at Hospital after 10 days.

20. **Cause:** While a contractor worker opened a live 100Amp, 415V, ICTP switch unauthorizedly he received electric shock and succumbed to his injuries, about two hours later in a hospital.

21. **Cause:** "While a Contractor employee was passing nearby an 6.6 KV overhead line, one of the line conductors got grounded through rail pole and stay wire and inadvertently his right hand palm came in contact with live stay wire which resulted in his death due to severe electric shock.

22. **Cause;** While an electrician was climbed upon bamboo ladder and trying to discharge an overhead line with the help of a small piece of PVC insulated wire, suddenly heavy flashover occurred which resulting into serious burn injuries on his both upper limbs, neck & chest and suddenly he fell down from a ladder at height of about 5 meter and sustained bodily injuries to his right side ribs.

23. **Cause**: - While an Electrician & Electrical helper were trying to remove dummy box of FLP Air Circuit breaker the dummy box slipped and came in contact with live Air circuit breaker cable terminal bushings studs, causing heavy electrical flashover which resulted into burn injuries on left cheek, upper limbs, stomach, forehead and thigh and right hand fingers of electrical helper & both hands, stomach & face of Electrician.

24. While discussing with an electrician, driver of a contractor's vehicle suddenly collapsed and received serious injury when his head hit edge of a girder adjacent to the platform on which he was standing. When taken to hospital doctors declared him brought dead. Half an hour after the accident.

How to Develop Safety Culture in Work Place

B . Srinitha Reddy
D/o B. Guru Sekhar Reddy
Asst General Manager – Mines.
M/s. Sri Chakra Cement Ltd

Work Place culture has become very trendy. The concept of safety culture esculpated by the mind sets, attitudes and behavior of workers, superiors, Managers and owners towards safety in the work place. A Positive safety culture in the work place is absolutely a vital part of successful and effective health and safety programme.

Six tips to Begin establishing and maintaining a strong and Positive safety culture in our work place.

1) **Communicate:** A great way to increase safety communication while building a positive culture is to hold weekly (or) monthly safety talk .Increase workers buy-in-by having them lead the talks. Make safety Polices readily available electronically (or)on paper and use to communicate safe practices, expectations and best practices when it comes to safety in your work place.
2) **Provide training:** - Training Employees demonstration your commitment to safety .Trained employees also embrace safety culture work readily because they are aware of hazards and the effect that can have on monitoring work place safety.
3) **Lead by Example:** - Lead by example by following all safety polices and encouraging employee's to do the same of management commits to safety, Employees will follow suit safety in more than talking the talk it walking than walk.
4) **Develop and implement a positive reporting**
   - **Process:-**Reward employees who report safety hazards or concerns. A positive safety culture will be much easier to build and maintain when employees feel comfortable reporting concern and believe that the reporting process is positive.
   - **Are your safety vision:** Everyone should be in the same boat when establishing goals and objectives for their safety culture.
   - **Enforce accountability:** Create a process that holds every one accountable for being responsibility involved especially Manager and supervisors. They are the leads for a positive charge.
   - **Provide multiple options:** Provide different options for employees to bring their concerns & issues full to face. These should be a chain of command to make sure supervisors are held accountable for being response.
   - **Report:** Educate employees or the importance of reporting injuries, first aid and near miss prepare for an increase in incidents of currently there is under reporting. It will help off eventually
   - **Build trust:** when thinks start to change in work place it is important to keep the worker calm. Building trust will helping one work together to see improvements.
   - **Rebuild Investigating System:** Evaluating the incident investigation system is critical to make sure investigations are conducted in an effective manner. This should help get to the root cause of accident and incidents.
   - **Celebrate success:** Make your efforts public to be every one motivated and updated through the process
5) **Involve workers:** Building and maintaining safety culture start from the ground up. Another way to build up strong employee buy-in-is to involve them in the process. Ask them what they would like the reporting process to look like or get their feedback communication method.
6) **Put your JHSC into Action:** having a trained and effective JHSC is a great way to show safety culture is action it demo street a commitment between works and manager to safe work and marinating a positive safety culture.
7) **Culture building tips:** creating an effective safety culture is an ongoing process and is a large commitment on behalf of the entire company.
8) **Define safety responsibilities:-**Do this for each level with in your organization. This should include polices, goal and plans for the safety culture.

SAFETY IN MINING– Advanced Technologies to prevent accidents in mines

K. Kiran Kumar Singh,
Manager (Mines) & Zonal Safety Officer,
Jaggayyapeta Limestome Mine, Jaggayyapeta
RINL/VSP
Ph.No:9701347033

Mining disasters are some of the most horrendous of man-made disasters due to their scale and the anguish they cause. Yet they need never happen if proper protocol is observed. Many believe that lack of safety standards, work regulations and regular inspections to un cover irregularities make many mining disasters corporate murder. Workforces, processes and advances in technology are constantly changing and evolving industries around the world. When used to streamlined processes or increase efficiency, technology can make the difference for a business being more successful than competitors that are slower to adopt and implement new technologies. The mining industry is no exception. Though the mining industry has been slower to adopt new technologies, advancements are offering greater ore recovery, flexibility in mining operations, increased productivity, greater safety, and lowering costs.

THE NEED FOR MODERNIZATION

The advances in mining technology are very promising. Incorporating automated systems that offer greater productivity, purposing new technologies to aid in the discovery and accurate quantifying of deposits, and systems capable of real time analysis to increase efficiency and profitability, all stand to not only change but modernize the entire mining industry. Few upcoming technologies are explained below:

I. HUMAN AND AUTOMATED SOLUTIONS

1. *DRONES*

A drone isn't the first thing one thinks of when discussing mining exploration or mine safety, but Flyability has been successfully working to change that.

Drone usage for mining has had to overcome some key challenges. Unsteady ground, falling rocks, and obstacles to spot and work around not only make it difficult and dangerous for a person to go down and chart a mine, but can also prevent most drones from working underground. A single bump against a hard surface can break a propeller, crippling a drone.

The difference with the new Elios drone is that it's the first drone outfitted with a rotating carbon fiber protective frame, or cage, that protects the propellers, camera, and drone body from damage as well as keeping it stable in the air upon collision. It has already been successfully used to explore the North American Palladium Lac des Iles mine in Ontario, Canada.

2. *BLASTING TECHNOLOGIES*

Excavating rocks is usually done by miners drilling holes into the rock, then filling those holes with explosives to blast away the hard rock in surface and underground mining. For underground mines, this presents a fire hazard as well as potentially destabilizing and collapsing the mine. New advancements in micro-explosives used in conjunction with computer-assisted-design and timing look promising to reduce the dangers associated with blasting. Using micro-explosives would also result in greater of control fragment size – reducing the cost, time, and energy requirement for downstream crushing and grinding.

3. *ROBOTIC DRILLS*

An automated drilling rig offers mining companies a mobile and rapid solution for hard rock excavation. While there are many variants of automated drill rigs in development, perhaps the most promising are battery operated drill rigs capable of drilling blast patterns more quickly and accurately than any human or human operated equipment. Battery operated drill rigs, unlike their diesel or gas counterparts, don't produce harmful exhaust fumes. Battery powered drill rigs also hold promise for lowering maintenance costs and if equipped with rapid chargers, or replaceable batteries, would contribute to the long-standing need of creating continuous mining operations.

In addition to being much more efficient at drilling blast patterns, automated drill rigs can be equipped with the latest advancements in cutters or preconditioning equipment – making cutting easier. These technologies include preconditioning the rock with water jets, thermal and explosive impulses, as well as other technologies being developed for weakening rock.

4. *SELF-DRIVING ORE CARRIERS*

Using the same type of automation technology as seen in other self-driving vehicles, ore-carrying vehicles such as above ground earth movers and underground ore carriers are able to work 24 hours a day, while removing people from the dangers inherent in their work areas. Some of these above ground ore carriers are over three stories tall, and operate effectively with automation programming. Underground ore carriers are being outfitted with radar and laser scanners that allow them to navigate in the dark through areas that pose breathing hazards. Advancements in battery technology are leading to the development of battery electric vehicles (BEVs) for mining – both above and below ground.

Rio Tinto is even in the works of developing automated ore trains that can carry ore for hundreds of miles.

5. *ROBOTIC ASSISTANCE*

Not all technological updates to mining are replacing having boots on the ground, some are just giving them a helping hand.

The mining assistant "Julius" is a wheeled robot that is roughly the size of a shopping cart. It is equipped with a robotic arm that ends with a three-fingered hand that is able to hold scanning devices still enough to analyze ore samples. This job is normally performed by humans, but after a hard day in the mine it can be difficult to do, so Julius offers a good alternative.

6. Proximity detection and collision warning

Collision between machinery or between machinery and personnel is one of the common causes of accidents in underground as well as open pit mines. Proximity detection technology can be installed on mobile machinery to detect the presence of personnel or machinery within a certain distance of the machine.

NIOSH developed an active proximity warning system, called the Hazardous Area Signalling and Ranging Device (HASARD), for warning workers through visual, audible and vibratory indicators as they approach dangerous areas around heavy mining equipment. Caterpillar has also developed detection technology called Cat Detect Personnel that features as one of the five sub-modules of its integrated mining management suite Cat MineStar. The technology involving RFID tags worn by the workers and the detectors mounted over the machines to warn operators with audio and visual indications of possible collisions, speeding or rollovers.

7. Computerised permit-to-work system

The effective management of a permit-to-work system is critical to mine safety as it tracks the authorizations and competencies of employees while identifying the key risks involved with a particular job.

A computerized permit-to-work system collating all required documentation for specific types of work, taking into account the specific identified hazards and the precautions needed to be taken by workers, is helpful in ensuring mine safety at the work authorisation level. ApplyIT, a South African software company, for example, has developed a permit-to-work authentication system called IntelliPERMIT that integrates all aspects of permits-to-work, access control and risk assessment, tracks the authorisation levels of each employee at work, and ties permits into access control with biometric fingerprint identification. IntelliPERMIT has been installed at Newmont MiningCorporation's Boddington mine in Australia.

7. Fatigue monitoring

Distraction caused by long working hours creating tiredness in truck drivers and machine operators working at the mine site is a common cause of accidents. The technology, capable of constantly detecting the onset of fatigue and micro sleeps in the operators and creating an alert for them, is helpful in preventing such accidents.

Seeing Machine, an Australian company, has developed fatigue monitoring systems called Driver Safety System (DSS) using patented eye and head tracking technology. The DSS comprises of a dash-mounted camera constantly detecting the fatigue and distraction in the driver's eyes.

II. CHANGES TO THE WORKFORCE

While many of the restrictions in favor of the environment have been reversed or loosened, in order to spur job growth and help the U.S. mining industry recover, there is still a long way to get back to the levels of the last mining boom.

The old Appalachian mines, once reopened, would not be filled with rows of pickaxe-wielding miners in hard hats. As discussed earlier, some of these jobs would be automated. However, that does not mean that machines are replacing human workers entirely, but that the workforce itself is changing. In some cases, those jobs just don't exist anymore in some cases, or there's little to no interest in doing them.

THE MODERN MINING WORKFORCE

"Smart mines" will be, and are using, all of the above technological resources. This means less front end manual labor, and more jobs in human resources and technology.

The mining industry is still playing catch-up toward implementing real-time data analytics, and this will result in a coming boom of hiring for information technology positions. It is no longer about finding willing hands to do the excavation and extraction, but finding the right analysts, programmers, and operators to control the technology.

With new models of operation come new management strategies. Part of this will mean retraining miners as knowledge resources, or as consultants. With that said, many positions will remain and need to adapt to support a mining technology industry. This includes IT consultants, truck drivers, suppliers, and other METS (mining, equipment, technology, and services) positions that support the changing mining ecosystem.

With the mining industry moving forward, technologically speaking, many of the systems surrounding the industry will require new skills and training. Workers will be required to possess a new set of skills needed to operate new machinery, new technology, or work along-side and support automated systems. This will present a significant challenge for those currently in and looking to stay in the mining industry. For forward thinking individuals with a willingness to learn, or entrepreneurs willing to capitalize on a transitioning industry, advancements in the mining industry could be a great opportunity for an influx of new labor that has grown up in a very technological society.

III. MODERNIZING MINING INFRASTRUCTURE AND MINING CAMPS:

The advances in mining technology are very promising. Incorporating automated systems that offer greater productivity, purposing new technologies to aid in the discovery and accurate quantifying of deposits, and systems capable of real time analysis to increase efficiency and profitability, all stand to not only change but modernize the entire mining industry.

The modernization of the mining industry will have a large impact on supporting industries and businesses. One such industry is mining infrastructure and camp systems. With the implementation of new technology, mining companies will be able to operate with greater speed and efficiency, producing higher yields, and see the life-span of mines decrease. This will require a new way of thinking when it comes to building mine site infrastructure.

Continued advances in mining technology have the potential to reduce the extraction period of a mine nearly in half. A mine given a 30 year lifespan, with the adaption to new mining technologies, could see the mine's lifespan decreased to 15 to 20 years. This makes investing millions of dollars into permanent infrastructure not as economically feasible.

While there are certainly many avenues for mining companies to pursue when it comes to looking for modular buildings, or prefabricated building solutions, none hold the promise or capability of engineered fabric structures. Designed for rapid setup and take down, with minimal foundation requirements, and durability measured in decades, these aren't the "canvas tents" used by prospectors of years past, but relocatable building solutions designed for harsh conditions.

CONCLUSION: In regard to all major operational hazards, a mine operator should employ major hazard risk analysis (MHRA) and management practices for all mines. MHRA is not only useful to address safety hazards but also exposures to operational, market and financial risk. Risk analysis and management techniques start with the identification of major hazards and potential consequences of failures. Risk managers then assess the likelihood that an event will happen and the probabilities for each of the consequences. Often MHRA is done with involvement from all levels of personnel in an operation. Following identification and assessment of risks, management must determine how each risk can be avoided, eliminated or mitigated to a level "as low as reasonably possible" (ALARP). Adoption of advanced technologies will help in achieving the goal of zero accidents.

The top five potential hazards in open mining are explosives, unstable ground, Electricity, machinery and dust. All of these potential hazards have laws, regulations and precautions put in place to ensure a maximum standard of safety. This maximum standard of safety is only reached if the person who enters the mine follows the guidelines. The bottom line being that safety in the open cast mine comes down to each individual that enters the mine. If the miner is ignorant, complacent or plain lazy the safety of not only themselves but for others working with them could be at risk. It is the miner's responsibility to ensure that not only they are safe but also fellow co-workers are safe.

OCCUPATIONAL HEALTH – CURRENT SCENARIO IN INDIA

J.RAMA KRISHNA ,Dy.General Manager (Mines)
Bhavya Cements Limited

Universal Declaration of human Rights states that everyone has the Right to work to free choice of employment, to just and favorable conditions of work and to protection against unemployment. Indian constitution also state that ''state shall make provisions for securing just and humane conditions of work''.

Occupational Health Envisages coverage of all workers and has a strong focus on prevention. It aims at a). Protection of health at work, b). Promotion of health occupational diseases and accidents. Activities encompass not only health surveillance, emergency preparedness and first aid services but also include surveillance of work environment risk assessment and preventive & control measures. Health education and health promotion are also an integral part.

Occupational health also provide a practical tool for identifying priorities and pooling scarce resources to develop and integrative and effective occupational health system and service, tailored according to the national conditions and needs to each country improved conditions of work will lead to a healthier work force and improved productivity

Occupational health services are available to only 10-40 % of workers worldwide and to minuscule of working population in developing countries. Even where service re available their quality and relevance may be low. According to a recent survey of 49 countries carried out by international commission on Occupational Health the coverage of occupational health service varied in various countries from an estimated 0.5 % to close 100 % coverage of employees with majority having very low coverage.

Labour market in India

India's population crossed 1.21 billion according to the last government census carried out in 2011 (current unofficial estimates are above 1.35 billions). Of these 833 million reside in rural area and 377 million reside in urban area. However, the urban population has been on rise. Those in working age group are estimated to be 63.6 % more than 92 % work in the informal economy, mainly agriculture and services (60 % self-employed and 30 % without regular job's). Less than 8% have jobs in the organized sector mainly industry, mining and some services.

India's diverse economy encompasses traditional village farming, modern agriculture, handicrafts, a wide range of modern industries and a multitude of services. Slightly less than half of the workforce is tin agriculture, but services are the major source of economic growth employing less than one – third of its labor force. India has capitalized on its large educated English – speaking population to become a major exporter of information technology services, business outsourcing services and software workers.

Indian lour market has been estimated to be around 521 millions. It comprises agriculture : 43 %, industry: 24%, and services: 33% India IT companies currently serve two third of the fortune 500 companies and have a direct employment of 40 lakh's according to Ministry of Electronics & IT government of India. This contain 34 % of female employees.

Occupational Health in India

Major Occupational risks are accidents pneumoconiosis (especially silicosis), musculoskeletal, injuries, chronic obstructive lung disease, pesticides poisoning, byssinosis, asbestosis, noise induced hearing loss and workplace stress. Increasing proportion of females in the workforce adds to traditional OSH issues. Women are subjected to indoor air pollution due to biomass fuels (more so in rural area) and to the dual burden of home work and occupation. Agriculture, mining and construction have high levels of accidents and diseases.

Statistics on accidents and occupational illnesses is not easily available. Research report suggest that the official fatalities and injuries may be grossly underestimated.

According to ILO estimates, lack of occupational safety and health is responsible for the economic loss to the extent of 4 % of GDP which is a huge number. However recent studies indicate that the loss could go up to 10% of GDP, in case of many developing countries like India.

The OSH challenges in India may be summarized as follows

01. Huge workforce oin unorganized sector
02. Availability of cheap labour due to high unemployment.
03. Meager public spending on health.
04. Inadequate implementation of existing legislation
05. Large no. of unrecognized/unreported occupational illness.
06. Relative shortage of trained and skilled OSH professionals.
07. Multiplicity of statutory controls.
08. Apathy of stakeholders
09. Infrastructure problems
10. Delay in implementation of national policy on OSH.

Policy, Legislation and training

India has 16 laws related to working hours conditions of services and employment. The major legal provisions for the projection of health and safety are contained in two acts the factories Act 1948 and the Mines Act 1952. The factories Act was amended in 1987. It provide for t pre employment and periodic medical examination and mandatory, periodical monitoring of the work environment in those industries defined as hazardous. These are other legal provision for protection of special I group of workers including those in plantation, docks, building and construction, tobacco, mining, and insecticide. There are also legal provision on prohibition and regulations of child labour. OSH is split between two ministries. While primary health care and medical education fall in the mandate of health ministry, the ministry of labour has the main responsibly of OSH.

Large and progressive organizations in the organized sector both private and public, have well developed occupational health services based on ILO conventions, however, this sector is miniscule. Medium and small industries focus only on getting compliance and occupational health largely remains on paper. OSH in the largest unorganized sector is almost nonexistent. Currently there is no government agency or department that deals exclusively with OSH matters. DGFASLI deals with the safety and health of worker employed in factories and ports whereas as the Directorate General of Mines Safety deals with safety and health of miners. There is no agency that covers safety and health for workers in unorganized sector.

Occupational health in Indian industries.

Bhopal gas disaster led to an extensive review of health and safety legislation in the country. Indian factories Act amended in 1987 provided for the provision of occupational health centre along with availability y of certified occupational health physicians in hazardous industries. While progressive industries may follow the applicable statutory provisions it is open secret that this is followed only on paper by many industries.

Occupational Health in unorganized sector and home workers

Only about 7 to 8 % of our working population works in the organized sector industry, mining, and some services. A vast majority works in unorganized sector including self employed/ home based work. Government has identified 7 unorganized sector for occupational safety and health consideration such as construction, agriculture, beedi & cigar workers, shop & establishments, waste management, transport worker and hone work.

This sector has huge challenges typical employer employee relationship cannot be established in self employed home base work and much of the unorganized sector there are no fixed wage leaver or social security for this population for occupational injuries and diseases.

Air quality as most important occupational hazard

Air quality in the workplace is probably the single most important workplace hazed in India worker are most commonly susceptible to hazardous air qualities if they work in construction, mining, manufacturing or agriculture industries. In these industries and others, respiratory hazards can include gases such a ammonia and carbon monoxide vapors such as gasoline and chloroform dusts such as silica coal and grain mists such as spray pains and chemical steam and fume caused by welding and smelting.

Protection from respiratory hazards

To project worker from chronic and acute respiratory illnesses, employers should provide engineering controls, administrative controls, measures to improve air quality at the work environment and lastly personal protective equipments to the workers. However compliance to wearing these PPE is unsatisfactory due to lack of awareness among works.

Some ways to administer engineering controls include installing ventilation systems, and enclosing or confining operations to avoid employee exposure to hazardous air qualities administrative controls include using signs to keep worker away from hazardous areas changing work procedures, or training employees to work in safer way.

Integration of HSE

The global trend is towards integration of health safety and environment sections to gather under ht banner of HSE department. However, in a large number of Indian industries health and safety work independently usually, health has a curative focus and is treated as a welfare measure making it a part of human resource and welfare department. This reduced the focus on occupational health and most doctors working in the industry confine themselves to health centers with inadequate exposure to work place hazards. The fact that the occupational diseases have a long latent period making it difficult to appreciate the causal relationship further weakens the occupational health.

Given the strong connection between occupational safety and health in primary prevention of occupational illnesses both these functions need to be integrate in the industrial scenario along with work place environment.

New age worker new risks

The future threat to employee productivity and health comes from the burden of life style associated disease India is undergoing an epidemiological of death as we get better at tackling infection accordion to WHO, 60% of the total deaths in India are attributed to non commutable disease.

It is estimated that the economic burden of non communicable disease would be $6.2 trillion for the period 2012- 30. A figure that is equivalent to nearly nine time the total health expenditure during the previous 19 years, of $710 billion. To combat this threat we need healthy workforce and protect its productivity. The best way to ensure the same is by creating wellness at work place.

As the proportion of young employee increase in the working population, the employee mortality and morbidity is significantly affected by accidents, mainly transport related. Therefore, inculcating safe behavior and defensive driving habit among employee is imperative.

Nanotechnology

With the advancement of technology and make in India initiative, manufacturing industry is changing in India. Nanotechnology is one such important area. Nanotechnology includes materials and manufacturing, electronics, computers, telecommunicated and information technologies, medicine and health the environment and energy storage, chemical and biological technologies and agriculture. The ministry of electronic and information technology has promoted Nano-Electrics research and establishment of centres with nanofabrication facilities India ranked third in the number of paper published and there have been 300 patent application in the Indian patent office in 2013.

A primary area of concern is the potential adverse impact on worker, since they are the first people in society who are exposed to the potential hazards of nanotechnology. thus there is a need for responsible development of nanotechnology.

Emotional health

Emotional /mental health has become very important challenge across organization there is a stigma attaché to mental health in most developing countries and special efforts are needed to address the issue given the immense importance of this issue a separate article titled importance of mental health in occupational health has included in this issue of the chronicle

Work place health and employee engagement.

Most workplaces act as a cohort providing the opportunity y to inculcate long term health habits among the working population. Wellness at workplace is important to prevent increased lifestyle-related diseases among employees. It includes good and balanced nutrition, stress management and a right kind of posture.

In the new globalized set up of work life, employee engagement has become the most important factor to achieve not only business result but also occupational health. workplace wellness provides and excellent opportunity to engage the employees achieve protection from impending health threats and achieve excellence in health promotion

The solution calls for new ways of employee engagement talking their language to catch their attention high tech and high touch is the new approach for the gen population. All enterprises need to adopt the uniform objective of creating health workplace and health workforce to neutralize the effect of employee migration while maintaining their unique way to achieving these twin objectives. An increasing focus on promotion of wellness is seen in progressive India industries, especially service industry including information technology sector.

Creating awareness

There is strong need to create OSH awareness among all stake holder such as lawmakers, employers, employees, contractor and the general public. OSH need to be included in educational curricula at all levels of school, university and technical education. public awareness should be created through mass media. The unorganized sector needs OSH training and effective awareness campaigns.

There is an urgent need to change the mindset of worker and employers through OSH education. We have seen many example where the trade unions give more importance to monetary gains over Redressal of work place health and safety issues during negotiations. However with increasing awareness and education this situation can be change. Trade union can be vety effective in the prevention of accidents and work relate disease through h the use of OSH as a collective baring issue and by exerting pressure on political leadership.

Conclusion

With its huge young population occupational health in India assume great importance in productivity and sustainability. Employment in the traditional agriculture sector is reducing and that in service sector is rising fast. Initiatives like make in India are expected to give a fillip to the stagnant employment in manufacturing sector.

Currently respiratory and musculoskeletal mental health issues are dominating the occupational health spectrum in India however disease lime non communicable disease and mental health issues are rising and will dominate the workplace scenario in future. In this scenario healthy workplace and employee engagement will have an important role I preventive strategy.

Given the fact that the working sector covered by current legislations employ less than 8 % of the working population, there is a strong need for an overarching legislation covering all sector of working life. Human resource situation in occupational health is several wanting and there is urgent need to augment the capacity building there is storing need for integrating occupational health with primary health care for effective delivery.

HOUSE KEEPING

Shri. V. Subramanyam
Chief General Manager (Mines)
Sagar Cements Limited

To some people, the word “housekeeping” calls to mind cleaning floors and surfaces, removing dust, and organizing clutter.

But in a work setting, it means much more. Housekeeping is crucial to safe workplaces. It can help prevent injuries and improve productivity and morale, as well as make a good first impression on visitors. It also can help an employer avoid potential fines for non-compliance.

The practice extends from traditional offices to industrial workplaces, including factories, warehouses and manufacturing plants that present special challenges such as hazardous materials, combustible dust and other flammables. Experts agree that all workplace safety programs should incorporate housekeeping, and every worker should play a part. In addition, housekeeping should have management’s commitment so workers realize its importance. Here are 11 tips for effective workplace housekeeping.

1. **Prevent slips, trips and falls:**

   Slips, trips and falls are the second leading cause of nonfatal occupational injuries or illnesses.

   Workplaces including passageways, storerooms and service rooms should be “kept clean and orderly and in a sanitary condition.” Also floors should be clean and dry and drainage should be present where “wet processes are used.”

   Employers should select adequate flooring (e.g., cement, ceramic tile or another material), as different types of flooring hold up better under certain conditions. Then, develop and implement housekeeping procedures using appropriate cleaners.

   “Things like oils and grease – if you don’t use the right kind of cleaning protocols, you’ll just spread slipperiness around rather than getting it up and off the floor,”

To help prevent slip, trip and fall incidents the following steps to be taken:

- Report and clean up spills and leaks.
- Keep aisles and exits clear of items.
- Consider installing mirrors and warning signs to help with blind spots.
- Replace worn, ripped or damage flooring.
- Consider installing anti-slip flooring in areas that can’t always be cleaned.
- Use drip pans and guards.

In addition, provide mats, platforms, false floors or “other dry standing places”. Every workplace should be free of projecting nails, splinters, holes and loose boards.

2. **Eliminate fire hazards:**

   Employees are responsible for keeping unnecessary combustible materials from accumulating in the work area. Combustible waste should be “stored in covered metal receptacles and disposed of daily,”

- Keep combustible materials in the work area only in amounts needed for the job. When they are unneeded, move them to an assigned safe storage area.
- Store quick-burning, flammable materials in designated locations away from ignition sources.
- Avoid contaminating clothes with flammable liquids. Change clothes if contamination occurs.
- Keep passageways and fire doors free of obstructions. Stairwell doors should be kept closed. Do not store items in stairwells.
- Keep materials at least 18 inches away from automatic sprinklers, fire extinguishers and sprinkler controls. The 18-inch distance is required, but 24 to 36 inches is recommended. Clearance of 3 feet is required between piled material and the ceiling. If stock is piled more than 15 feet high, clearance should be doubled.
- Hazards in electrical areas should be reported, and work orders should be issued to fix them.

3. Control dust:

Dust can affect equipment's length of life and quality of products. Dust accumulation of more than 1/32 of an inch – or 0.8 millimeters – covering at least 5 percent of a room's surface poses a significant explosion hazard, This dust accumulation is about as thick as a dime or paper clip.

An industrial hygienist should test the workplace for exposures if air quality and dust are concerns. Vacuuming is the "preferred" method of cleaning. Sweeping and water wash-down are other options. "Blow-downs" using compressed air or steam is allowed for inaccessible or unsafe surfaces.

4 Avoid tracking materials

Work-area mats – which can be cloth or sticky-topped – should be kept clean and maintained. This helps prevent the spread of hazardous materials to other work areas or home. Check all mats to ensure they are not tripping hazards.

Additionally, separate cleaning protocols may be needed for different areas to prevent cross-contamination. Avoid using the same mop to clean both an oily spill and in another area, for example" if the materials are toxic, industrial hygiene testing, uniforms and showering acilities might be needed. Employees who work with toxic materials should not wear their work clothes home.

5 Prevent falling objects

Protections such as a toe board, toe rail or net can help prevent objects from falling and hitting workers or equipment.

Other tips include stacking boxes and materials straight up and down to keep them from falling. Place heavy objects on lower shelves, and keep equipment away from the edges of desks and tables. Also, refrain from stacking objects in areas where workers walk, including aisles.

Keep layout in mind so workers are not exposed to hazards as they walk through areas.

6. Clear clutter

A cluttered workplace can lead to ergonomics issues and possible injuries because workers have less space to move. "When an area is cluttered, you're going to likely have a cut or laceration injury". "You're not going to have as much room to set up your workstation like you should and move around. You're going to be twisting your body rather than moving your whole body."

Keep aisles, stairways, emergency exits, electrical panels and doors clear of clutter, and purge untidy areas. Empty trash receptacles before they overflow

7 **Store materials properly:**

Storage areas should not have an accumulation of materials that present hazards for tripping, fire, explosion or pests.

Some workers make the mistake of storing ladders or other items inside electrical closets where they can block an electrical panel, creating a fire hazard and violating rules.

"Unused materials and equipment should be stored out of the way of workers. Avoid using workspaces for storage and remember to put everything back in its proper place, preferably in a storage space nearby so workers are encouraged to use it. There's a responsibility to keep work area in order and return tools to where they belong.

8. **Use and inspect personal protective equipment and tools**

Wear basic PPE – such as closed-toe shoes and safety glasses – while performing housekeeping. Determine what type of PPE to be selected on the potential risks.

Regularly inspect, clean and fix tools, remove any damaged tools from the work area.

9 **Determine frequency:**

All workers should participate in housekeeping, especially in terms of keeping their own work areas tidy, reporting safety hazards and cleaning up spills, if possible.

"Every worker does have a role in housekeeping," "If they see something is becoming a problem, they need to report it."

Before the end of a shift, workers should inspect and clean their workspaces and remove unused materials. This dedication can reduce time spent cleaning later, experts say.

How much debris or contaminants the workplace releases can help determine the frequency of housekeeping. A company should have a mixture of deep cleaning and more frequent, lighter cleaning that involves sweeping and responding to spills.

10 **Create written rules:**

Experts agree that housekeeping policies should be put in writing, they are formal and defined. Written protocols could specify which cleaners, tools and methods should be used.

There may be many gaps in the effectiveness of floor cleaning in the operations; sometimes some areas may be overlooked. That's why it's important for the written part of the protocols and defined training so people are aware of and follow the proper procedures."

11 **Think long-term**

Housekeeping should be more than a one-time initiative – it should continue through monitoring and auditing. Keep records, maintain a regular walkthrough inspection schedule, report hazards and train employees to help sustain housekeeping. Set goals and expectations, and base auditing on those goals.

"Safe Alert" Proximity Warning System for HEMM FMCW RADAR Technology Based

V.V.KRISHNA REDDY

AGM (Mines)

SAGAR CEMENTS LTD

"Safe Alert" **P**roximity **W**arning **S**ystem (PWS) works on the radio frequency at 2.4 GHz, to detect the moving and stationary objects in virtual sensing range. As per DGMS requirements, it gives both audio as well as visual indicator to alert the Dumper operator when it detects object in the sensing range of the RADAR sensor (**RA**dio **D**etection **A**nd **R**anging). This Radar sensor works on **F**requency **M**odulated **C**ontinuous **W**ave (FMCW) technology and detects stationary as well as moving objects.

"Safe Alert" PWS provides continuous monitoring of the obstruction in the virtual target area and in the blind spot and alerts the dumper operator. The system gives the visual indication which increases in intensity as the object comes closer to the operator. Also the audible tone beeps per second increases as an object becomes closer. Nearer the object, sound alert will give more beeps/sec.

"Safe Alert" Proximity Warning System for HEMM consists of three components,

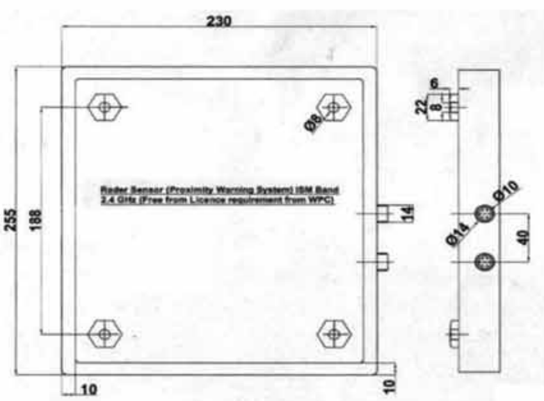
1) Controller with display Model - AG-PWR-XXRR
2) External Radar sensor(s) Model - AG-RAD-101 (environmentally sealed)
3) Cable system to connect the sensor(s) and the controller Model AG-HAR-XXRR

In one controller with display model - AG-PWR-**XXRR,** can connect maximum up to two RADAR sensor(s) Model - AG-RAD-101. (more than two sensors is under R&D)

*(**XX** = 01 or 02 is the number of RADAR sensors, **RR**= 10 m, 15 m or 20 meters. is the sensing Range).*

The three detection ranges in RADAR sensor, which is from 0 to 10m, 0 to 15m, 0 to 20 meters. Sensor covers more than 60% area of detection in a virtual target area of Dumper.

Rador Based Proximity Warning system **Using AG-RAD- 101 Sensor**		
Model Number	Number of Sensors	Range in Meters
AG-PWS-0110	1	10
AG-PWS-0210	2	10
AG-PWS-0115	1	15
AG-PWS-0215	2	15



AG-PWS-0120	1	20
AG-PWS-0220	2	20

Higher range and more number of sensors is under development

Virtual Target area in front and rear of the Dumper:

a. Width of the virtual target area is same as the width of the dumper
b. Length of the Virtual Target area of Blind spot distance with a uni-directional tolerance of (±) 1 meter
c. One of the edges that represents the width of the Virtual Target area will pass through the inner edge / rear axle of the bumper.

d. The centerline of the virtual target area and the machine centerline will coincide.

Wireless **P**lanning and **C**o-ordination Wing (**WPC**), a government of India, authority to issue the licence and approvals to use Radio Frequency in India. WPC has given **E**quipment **T**ype **A**pproval, (**ETA**) for RADAR type proximity warning system sensor Model - AG-RAD-101, which operates at 2.4 GHz frequency. For the use of this frequency no license is required from WPC.

Advantage of Proximity Warning System "Safe Alert" Radar Frequency Modulated Continuous Wave technology:

1. **DGMS requirement**: -It gives audio and visual indicator of obstruction in the virtual target area to the operator. Fulfills all the requirements of DGMS.Helps to prevent collisions.

2. **Very Rugged** :-As the Radar sensor is made from polycarbonate and mild steel material. The environmental effect is negligible. Designed foroutdoor in mining dusty/rainy condition environments.

3. **Operating Voltage:-**12V to 28V DC supply for Controller and Display Module.

4. **Detection Type:-**Stationary as well as moving obstructions. Object detection includes hard and soft target objects.

5. **Sensing Range:-**0 to 10m, 0 to 15m, 0 to 20 meters.

6. **WPC ETA approval:-**Equipment Type Approval (ETA) for "SafeAlert" system is granted by WPC so no need to take further approval for the frequency by the user.

7. **Operating Temperature:-** 0°C to 70°C.

8. **EMI suitability**:-Acoustic and electrical noise resistance. Real-time auto calibration and noise rejection for every ranging cycle.

9. **Reliability:-**Reliable and stable range data, Quality narrow beam characteristics. Very low power consumption. Excellent for multiple sensors. Sensor reports the range reading directly due to in-built processor. No calibration requirement.

10. **Mounting:-**Easy mounting, Extra Compact Housing.

Description:

The Radar sensor module (AG-RAD-101) provides very short to long-range detection and ranging, in an extra compact, robust Polycarbonate and mild steel housing, designed to resist water intrusion. This sensor has a serial / pulse-width output along with real-time auto calibration for changing conditions (temperature, voltage or electrical noise) ensuring reception of the most reliable (in air) ranging data for every reading taken. The low power operation detects objects in sensor range up to 20 meters and provides range information with 4 LEDs. Audio alert is also provided; audio sound alert varies with the sensing distance. The interface output format is: pulse-width/serial output.

Radar Sensor Module Specifications (AG-RAD-101):

Sensing Range	:	0 to 10m, 0 to 15m, 0 to 20 meters.
Operating Frequency	:	2.4 GHz – 2.4835 GHz License free band in India.
WPC ETA approval no.	:	2997/16-RLO (WR), Dated 29/01/2016
RADAR Technology technology, this	:	**F**requency **M**odulated **C**ontinuous **W**ave (FMCW) detects stationary as well as moving objects.
Number of Sensors	:	1 to 2 depending on the Vehicle. (3 & 4 Under R&D)
EIRP power	:	< 1 Watt (< 30 dBm).
Min. Receive Sensitivity	:	-75 dB.
Beam width / height	:	80°/ 40°.
Operating Temperature	:	0°C to 70°C.
Noise cancellation	:	Adaptive
Patch Antenna	:	10 dB (+/- 1 dB)
Housing Material	:	Polycarbonate and mild steel

- Designed as per mining / industrial conditions. Can be used in heavy dusty, muddy, humid and rainy conditions.
- Separate sensor and display module (multiple sensors can be connected to display module).
- Micro-controller present in each sensor. This provides better calibration and communication with display module.
- Single cable interface makes it easy to connect in field.
- Easy mounting.

Development of a Universal Safety Behavior Management System for Mine Workers

V. Yugandhar Reddy

Dy. Mgr (Sagar Cements Ltd)

Background:

Over 80% of all work-related deaths in the mining industry occur in mines and human factors constitute 85% of the direct causes of mine accidents, which indicates that significant shortcomings currently exist in the safety behavior management of mine workers. We aimed to verify the impact of human psychological behavior in mine accidents systematically through experimental study, theoretical analysis and management application.

Methods:

Four test instruments (Sensory and cognitive capacity test, Personal Factor Questionnaire, Symptom Checklist Questionnaire and the supervisors' evaluation) were employed to identify unsafe behavior factors, the self-established Questionnaire of Safety Behavior Norms (QSBN) was also used to propose the safety behavior countermeasures of coal mine employees.

Results:

The mental health of most coal mine workers' is relatively poor. The sensory and cognitive capacity of those in different work posts varies greatly, as does the sense of responsibility. Workers are susceptible to external influences, and score low in site management. When the sensory and cognitive assessments were combined, the psychological index predictive power was greatest for estimating sense of efficiency and degree of satisfaction in internal evaluations, while at the same time lowest for estimating control of introversion-extroversion and stress character.

Conclusion:

The psychological indicators can predict part of employee safety behavior, and assist a mine enterprise to recruit staff, develop occupational safety norms and improve the working environment.

Introduction

Production safety and accident prevention have become major focal points in the mining industry. With this in mind, the safety-consciousness of employees is critical to improve coal mine safety in China. However, significant shortcomings exist in the safety behavior management of mine workers .

Mine employees come from a variety of social backgrounds influenced by different factors during their work. Thus, their safety-related occupational psychological factors and behaviors can differ greatly, making it difficult to identify universal patterns of unsafe behaviors that can be addressed by safety management. A successful manager of a mine should consider a multitude of factors in order to identify possibly risky actions and strive to reduce this risk . If a risky core action can be identified in the work process, it can be altered, and will subsequently become a component of the workers' training, their performance evaluation, and the promotion criteria at all applicable levels in production and management.

Most mine safety researchers are not experts of the mining industry or the fields of psychology and praxeology, and their respective approaches to researching the subject are therefore limited. In other words, current research into mine safety is lacking in certain areas of relevant expertise , hence interdisciplinary collaborations are needed to identify the systematic problems impacting safety in mines. Furthermore, systematic safety-related problems require systematic countermeasures in order to fully implement appropriate safety management. However, although maladaptive safety-related behaviors may occur among workers at various levels of the production process, current safety management efforts in mines focus primarily on the single point in the production chain that is most closely related to the safety shortcoming.

Most studies of mine safety have focused on the occupational psychological factors that contribute to accidents and the response of management to address these safety-related shortcomings. Studies have investigated the direct causes of accidents, the motivations for maladaptive safety-related behaviors, and the management of safety behavior. Accident causation theories, such as the accidental release of energy and catastrophe theory, have served as the basis of previous studies of mine safety. Multiple-factor analyses of mining accidents have examined the causes of accidents at the human, technological and organizational levels.

Literature review

Multiple interrelated factors contributed to accidents.

1)Explore the relationship between the mental concept of safety and the safe behavior of industry workers, and conclude that working tension is significantly related to safe behavior.

2)Apply safe behavior theory to industry, identifying the performance of unsafe behavior and how to avoid accidents.

3) study the relationship between personal characteristics, job characteristics, platform features and specific accidents, researching the accident model quantitatively.
4) predict the causes of mine workers' occupational injuries, and explored the physical discomfort and psychological pressures.

Workers' motivations for safety behaviors based on a number of theoretical models including (1) hierarchy of needs, (2) expectancy model, (3) two-factor theory,motivation-reward-satisfaction model, (4) expectancy theory, and the safety performance model . Other safety researchers have focused on the specific safety behaviors. Others have assessed the efficacy of safety behavior management through training, observing, and correcting employee actions in the workplace in order to enhance safety performance .

Researchers have investigated the occupational psychological factors that contribute to violations of safety regulations and the efficacy of preventative measures. Human error analysis, the quantitative analysis of behavioral mechanisms that contribute to accidents, and studies of countermeasures to prevent human errors have also been performed analyzed a system of risk management methods in a mine and implemented it into a system which manages and controls potential accident risks, hazard sources and human behavior risks. Analysis methods concerning the human error influence degree to analyze different behaviors of mine workers using the ABC method, collecting information on miners' work behavior through an ABC questionnaire.

Differences may exist between employees and managers with regard to their view of safety behavior management. Employees report that their unsafe behavior choices are influenced by the work environment, production quotas, management communications that may encourage unsafe behaviors and the system of rewards and punishments used by management. However, managers report that safety education and training are sufficient for the management and control of mine employees' unsafe behaviors. Differences also exist between management and production workers with regard to the effectiveness of countermeasures that are implemented.

Recent studies of behavior management based on occupational psychological factors have assessed the efficacy of various strategies for improving employee safety behaviors. Quantitative and confirmatory studies of safety behaviors associated with accidents in other industries. Miners safety behavior based on an evaluation of miners' thought processes, with the aim of modifying miners' decision-making skills regarding safety behaviors.

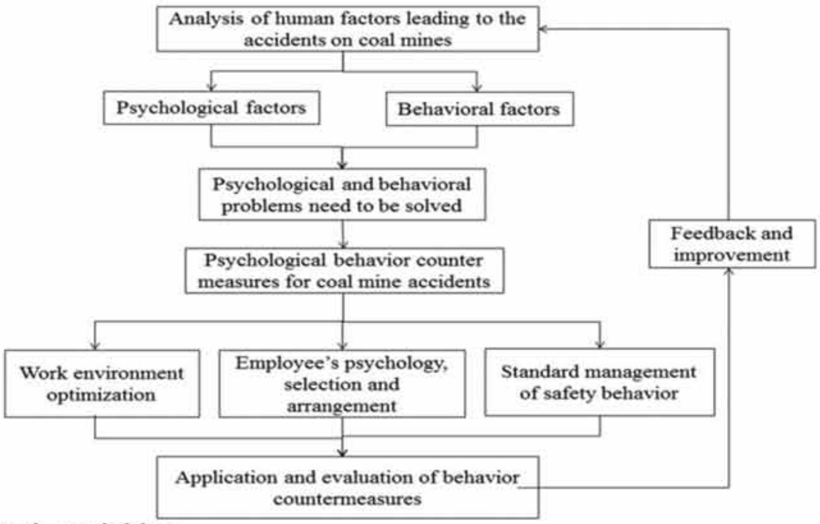
Studies of the evaluations of safety behaviors have also been based on Interdisciplinary research and application of related theories and methods regarding safety-related psychological factors have been employed, including the use of virtual reality and electronic simulation techniques,

Certain shortcomings exist with regard to the findings of previous studies of safety psychology and safety behaviors. Most of the qualitative studies performed were not based on original data. Safety evaluation methods,, were based on the experience of experts that were then adopted for the purpose of risk assessment, and were thus subjective in nature. The reliability and validity of the methods used in the quantitative studies of safety-related psychological factors and behaviors have not been confirmed among miners test subjects, which may also have resulted in bias. Furthermore, a number of studies did not perform a systematic analysis. At present, the application of many theories and technologies to the study of human safety behavior is highly problematic, especially with regard to the analysis of psychological factors and the quantitative analysis of group safety behaviors.

Because the human factors associated with accidents in mines may occur throughout the entire production process, an overall re-examination of safety management techniques in mines is required to assess the efficacy of current safety countermeasures. The aim of our current study was to analyze the relationship between the safety-related occupational psychological factors and the safety behaviors of miners and the countermeasures taken by safety management to identify systematic methods for improving the efficacy of safety management in mines .

Materials and Methods

Study design: Psychological assessments of employees who performed all types of work in a mine to gain an overall understanding of their safety-related psychological characteristics and safety behaviors. These individuals completed several psychological assessments in order to identify the human factors which lead to accidents in coal mines. These factors mainly include psychological factors and behavior factors. Potentially negative characteristics and behaviors were identified based on the results of the psychological assessments, including a sensory and cognitive capacity test, personality test, mental health test and adaptability to working. Using these factors as independent variables, and using work safety performance as dependent variables, a multiple linear regression method was used to pick up the main psychological and behavior factors which lead to accidents in the mine. On this basis, certain countermeasures to improve work safety can be proposed. The mine workers and managers were interviewed to identify the types of countermeasures taken by safety management, such as work environment optimization, employee psychological selection and arrangement, and standard management of safety behavior. These countermeasures were subsequently put into use, their effectiveness to improve production safety evaluated, and the results were used to provide feedback to safety management. The design and flow of information are represented in Fig. 1:



Research design and the flow of information (Fig .1)

Study variables:

The goal of our research was to establish a systematic safety behavior management strategy for mines. We performed a systematic study of the influence of psychological factors and safety behaviors on the frequency of mine accidents using a combination of experimental research, theoretical analysis and management application. By applying theories of safety psychology, safety behavior, and safety management, we examined the requirements of mine production activities for employees' psychological behaviors using psychological assessments, a behavioral evaluation, and an occupational analysis. Predictive psychological indexes were established based on a quantitative analysis of the variation in psychological factors. Management countermeasures were also assessed based on the psychological index.

Selection for the Psychological Questionnaire

Seventy employees comprising production supervisors, production workers, and gas checking employees consented to undergoing the psychological assessments. The sensory and cognitive capacity test was used to assess attention distribution, attention span, difference threshold sensitivity, choice reaction time and recognition capacity. The Personal Factor Questionnaire recognized as one of the most authoritative personality test methods available and can be used for anyone aged over 18, was administered to the employees. Apply this questionnaire to research and prove its rationality. The result of the Questionnaire is analyzed to assess the employees' adaptability to working in a mine environment. . Based on a job performance evaluation provided by their immediate supervisor, the employees' understanding of the safety procedures used in mines and their work performance also allowed a psychological index to be ascertained. These psychological indexes are established based on the results of the sensory and cognitive capacity test, and the supervisors' own evaluations.

Safety behavior countermeasures:

In the past, safety regulations and operation rules were only applied to the working area. However, now employee safety responsibilities extend far further. The safety awareness and behavior of employees is recognized as being critical to ensuring workers' safety at all times and in all places within and around the mine. Safety behavior countermeasures are designed based on the evaluation of mine employees representing each of the following work categories : mining, driving, electromechanical work, explosion prevention, and transportation. Each group of employees is assessed using a self-reporting questionnaire that demonstrated acceptable levels of reliability and validity. The safety behavior countermeasures are established based on the analysis of the results of the safety behavior norms questionnaire.

Data collection

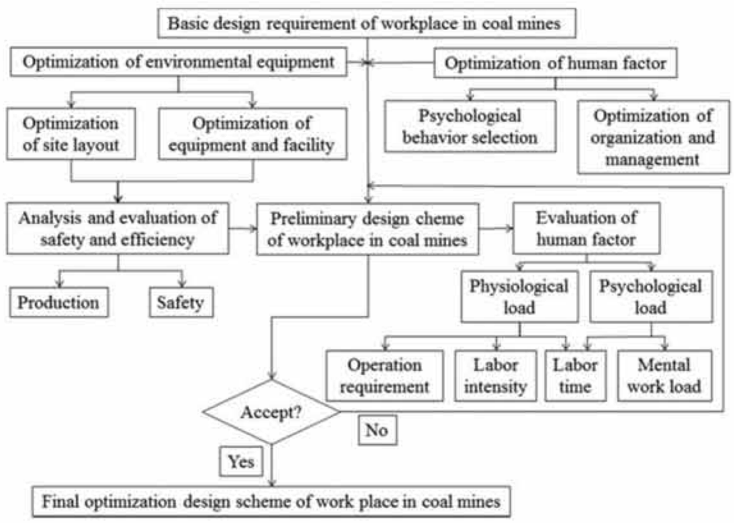
The research data are collected using the sensory and cognitive capacity test, psychological questionnaires, and self-reported safety behavior norms questionnaire. The assessments are performed in two separate investigations. In the first investigation, the psychological indexes are developed based on the assessments administered to a sample of some workers. . In the second investigation, behavioral norms are assessed

Optimization of safety behaviors based on work environment

Mine employees' safety behavior is influenced not only by their own attitudes and beliefs but also by their work environment. The mine environment can cause nervousness and anxiousness among mine workers. To ensure the employees' safety behavior, people, objects, and the environment must be coordinated to allow workers to focus on safe production practices, rather than requiring them to constantly adapt to their surroundings, which contributes to behavioral errors by distracting and mentally fatiguing workers.

The integrated application of safety behavior science can be used to optimize coal mining systems using human-machine system modeling, the goal of which is to obtain a high level of work efficiency and eliminate the physiological and psychological risk factors that contribute to accidents in the workplace. Our proposed design framework for the optimization of mines is shown in Fig. 2.

Design framework for optimization of the mine workplace



The main tasks include an ergonomic assessment of mine workers' actions in the mine environment and the derivation of mathematical descriptions of the psychological patterns that contribute to feelings of fear and anxiety among workers in the production environment. The results of these analyses were used to improve the safety and efficiency of the mine production process.

CARING FOR SAFER & HEALTHIER MINING EMPLOYEES

S.Ananth, DGM-Mines-Auto
Sagar Cements

Everyone one of us certainly must have come across various suggestions, advise from our friends, various other mining related persons, about the safety steps to be taken for the persons to whom we have engaged in our respective mine, or for that matter, one must have designed his own safety methods for for the working staff.

All said and done, every mine have different procedures, systems, methodology to work which purely depends on the local situation and circumstances. However, few points I thought of sharing on this subject. Generally, it has been noticed that we assume and presume too much unknowingly, rather than going in depth to find our the root cause. Here are few steps.

- Act swiftly to rectify the cropped up problems. When ever any problem is brought or highlighted by any mining personnel try to get those resolved quickly. If we try to drag our foot, or keep it pending for a longer period, or ignore, a negative strong signal and wrong message is being sent down the line, that we are least bothered or cared about their safety or on their health issues. Try to resolve it at the earliest possible time. If any problems takes time to get resolved, then timely feedback to the employees must be provided so that they are informed and they get to know that it is being addressed.

- Identify each and every hazards in the working areas and ensure to share these with each mining personnel. Make it certain that every employee understands what those hazards are, how to protect themselves from those, in what way those are dangerous and finally what they should do in case if they are exposed to any of those hazards.
- Respect to employees suggestions. Listen to them with patience as this will certainly help us to have them on board. However, it may not be possible to implement all their suggestion, but then, at least listening to them shows the concern. Over and above this helps in employee participation and employee ownership and needless to mention that this ultimately leads to employee driven safety at the end for which we are all looking for.

- Make it a point and ensure compliance with all safety and health standards. Each detail of the safety procedures / standards are complied without any compromises, as we all understand that safety is not an negotiable issue. Apart from complying the statutory requirements we also must be sure that we implement our own safety and health policies. The important point here is that, every employee must and should understand such implemented policies / standards etc.

- A good manager will always try and ensure to minimize the risk in his working area. This sounds to be a tough job, yes, but then, one has to do it to make sure that the employees are safe. Routine and scheduled safety audits will help to be more effective. For scheduling audits there can be a cross functional team for eg, maintenance team audits operation of mines and vise versa. This will bring out the issues which can later be discussed and sorted out. Never forget, training and re-training of the employees which is one of the most important task. Ensure that they learn the techniques, skills and make them fit to work. Retraining them every often will update their knowledge so that they work safely. Any change in the system or in the procedure or any modification on the equipment's should be briefed to one and all. Have frequent safety meetings with proper records. Such meetings should always be treated on priorities. Let them speak in the meeting, while we listen them with our ears open. Ensure that the points raised in the meetings are taken care wherever feasible with a proper communication down the level.

- It is generally presumed that the working staff shall implement what ever they have learnt in the training or they will follow all the instructions given by their superiors. Various surveys suggests that they take more risks, short cuts and at times ignore the warnings and instructions provided by their superiors. Now, here its the responsibility of the line manager to monitor their safety performance and provide them the positive and the right feedback to ensure their safety in their work with right attitude and proper behavior. In most of the places this is being ignored which is one of the root cause of incidences. We hesitate to provide them the required feedback.

-

If you are a parent, you have probably already realized that your children are always watching what you do. And just as children watch their parents and emulate their behavior, so do employees who are watching their bosses - John c. Maxwell

BLAST DESIGN

N. Srinivasu
Junior Officer (Mines)
Sagar Cements Limited

➢ BLASTING DESIGN.

The first step in designing the cut is to design the blasting such that the blast effects are controlled to suit the requirements of the operation. Blasting operation is the cheapest and fastest method of breaking in-situ ground, we should take care about blasting performance to optimise mining and crushing operation. A common way of designing a blast is using the Powder Factor method.

➢ POWDER FACTOR.

The powder Factor is a common term used frequently in blasting operations and means simply the quantity (Kgs) of explosives necessary to break a certain quantity of rock. The Powder Factor term is very general and does not define the distribution of the explosive in the hole, the pattern, hole size or face height and sub-drilling, Normally, the sub-drilling is not included for calculating Powder Factor because it is not pay rock.

➢ POWDERFACTOR PROCEDURES. Determine total explosive per hole as follows:

a. Determine borehole diameter.
b. Determine borehole depth.
c. Determine stemming.
d. Determine sub-drilling.
e. Determine charging column (amount of blast hole to be loaded).
f. Determine Quantity of explosive per metre of blast hole, blaster must know the explosive densities.
g. Determine total quantity of explosives in a blast hole. Find the pattern that blast hole load can break.
h. Determine the total quantity of explosives in the total pattern.

➢ **DRYING BOREHOLES**.

Some boreholes may contain water. Explosive cartridges can be used to displace the water in the boreholes, but it is advisable to pump the water out, or below it out with air. When selecting an explosive keep in mind its water resistance. (Ammonium nitrate fuel oil (ANFO) mix is water soluble.) Cartridge must be used to fill the hole above the water level. As cartridges are added the water is displaced and rises. The formula for determining the resultant height of water is:

$$H = \frac{\frac{DxDxW}{h}}{\frac{DxD}{h} \quad \frac{DxD}{c}}$$

Where,

H = *Resultant height of water in feet (where cartridges built out of water*

$\frac{DxDxW}{h}$ = *Borehole diameter in inches squared.*

$\frac{DxD}{C}$ = *Cartridge diameter in inches squared.*

To calculate powder factor: Spacing x Burden x Hole depth x density of mineral / rock x No. of holes
Total quantity of Explosives in Kgs

- **Log Books And Records**:
  Formulation of quarry records is imperative due to the rotationof blasting crews and deployed units. The quarry records are kept a minimum of five years. One clear copy of the quarry record is kept at the quarry on file for future reference.

- **Drilling Records:**
  Drilling records are important in respect to priming and loading,
  showing cracks and seams, type of material, and problems encountered drilling the boreholes. The Head Blaster gives the Head Driller the shot location, shot location, shot pattern, hole depths and any information from previous blasts helpful in drilling. After drilling the pattern the Head Driller fills out the Drilling log showing actual depth, cracks, seam sand voids. A diagram of the pattern and bench face is drawn at the bottom of the page. The Head Blaster will use this form to show explosive location in the hole, stemming, deck loading, etc. On the shot diagram the trunk lines, MS connectors and initiating devices will be drawn in. The tool list is for tools used in the blasting operation. Chronological time is kept for the blast.

- **Loading Record**.
  The Quarry Loading Record (Appendix B) is a written description of the explosives and other pertinent information for each hole. This record is filled out by the Head Blaster.

- **Shot Record.** The Quarry Shot Record and Explosive Inventory (Appendix C) is a record of explosives and general information. It provides future reference for information regarding a shot. The Quarry Shot Record and Explosive Inventory is filled out by the Head Blaster.

- **Explosive Log.**

The Blaster's Explosive Log (Appendix D) is a prior planning document and check list used by the Head Blaster to manage the blast properly. A Head Blaster should not rely on memory to conduct any blasting operations. A written plan of the blast needs to be in the blaster's possession. The Blaster's Explosive Log provides that plan.

➢ DRILLING PATTERNS.

After the desired width and depth of cut have been determined, the drilling pattern may be selected. The patterns discussed in the following paragraphs are pertinent to both vertical and inclined holes. Selection of a drilling.

Single Row Pattern.

- **Simultaneous Initiation.**
  This pattern is most desirable from the stand point of maximum breakage and displacement per hole drilled because it allows for a greater spacing. Normally, there will be two nearly vertical free faces, the front and one side. The hole nearest the open side is drilled one burden distance from each face. Corner holes are drilled one burden distance from the next hole and should be delayed to prevent back break or over break into the next bench. This delay may be accomplished with a delay cap or the hole (s) maybe primed and initiated separately after the others.

- **Single-Row Delay within Row.**

  This pattern requires more holes per width of face but gives the advantages of better fragmentation, less ground and air vibrations from the blast, and controlled throw of the broken material. The holes are initiated in sequence starting at the center and moving out in both directions at the same time in 0.025 second intervals with the exception of the comer hole which may be initiated separately at a longer delay as mentioned above. This initiation pattern will result in throw to the center. If the holes were to be initiated starting at the right and proceeding to the left, the throw would be to the right side of the face.

- Multiple Row Patterns. Multiple row patterns are of three types, staggered ,rectangular, and square, and generally require the use of delay caps or other delay devices.

- Staggered Pattern. The staggered pattern is used for simultaneous initiation of holes within a row and delays between rows. Throw is to the front with a small portion at the end of the bench being thrown off to one side. The staggered pattern may be used for simultaneous initiation of an entire layout consisting of not more than two rows of holes.

- Rectangular Pattern. Similar to the staggered pattern in spacing between rows and holes. The main advantage of this pattern is that it simplifies the maintenance of square comers on the bench by initiation of a delayed charge at the end of the row.

- Square Pattern. With the square pattern, throw can be directed toward the center or to the side by delayed initiation within rows. The volume of material obtained per hole using this pattern is nearly equal to that obtained in using the staggered pattern. The reason for this is that the spacing between rows is greater. The use of this pattern allows the maintenance of square corners with much greater ease than the staggered pattern.

5 Maintenance Tips to Extend Equipment Life

V. Saidi Reddy

Manager (Mines & Auto) Sagar Cements Ltd

Heavy machinery, especially Mining, Industrial or Farming Equipment, requires constant maintenance to keep it in good working order. Conversely, poorly maintained large machinery equipment runs inefficiently. Breakdowns are costly and safety is also an important consideration.

Here are five top tips for large machinery maintenance:

1. Stay on top of large machinery operator training

Many types of large machinery have multiple operators. One of the ongoing inspections on any checklist should be overseeing the correct operation of the equipment.

Large machinery should be inspected as soon as it is purchased. Operator training is usually done at that point, but training needs to be kept up. Employees come and go, skills become rusty and poor operation leads to breakdowns.

Operator manuals can be revised for the specific work situation. They can be rewritten in simpler language. A short manual can be provided to each operator for easy reference. And, if you operate in a paperless environment, you can rest assured operators use the most current version of each manual.

One other note is to identify best practices, which can then be applied to other facilities or geographic locations. The knowledge you learn about how to maintain your equipment can become quite valuable
– be sure to best leverage this important knowledge and use it at every applicable location.

2. Add and test lubricants frequently

Lubricants reduce friction around any moving part. A schedule of good lubrication maintenance extends the life of large machinery equipment and parts.

Lubrication is one of the first and most important of maintenance checks. Look for signs of excess oil or grease build-up on pistons. Check for leaks around oil seals.

Be sure to use the right lubricant. There are specific kinds of oil and grease for every component. Check the manufacturer's recommendations.

Getting the lubricants checked is a good way to diagnose problems with large machinery. Experts analyze particles in the used oil. The makeup of any contaminants will indicate which part may be suffering from wear or breakdown.

3. Check for signs of wear

Vibration, shock, high temperatures, friction and age all contribute to the breakdown of parts in heavy machinery.

- Vibration can come from gears and belts that are out of alignment
- Shock can come from accidents and from poor operator technique

- High temperatures can come from extended use, friction, poor lubrication and worn parts, among other reasons
- Age affects many key components. Over time, belts will warp. Seals will dry and crack. Bolts will loosen and stretch out of shape. Age is a factor to monitor in equipment.

Should you discover wear and tear on any moving parts within your heavy equipment, be sure to quickly perform the necessary replacement of any worn parts.

4. Keep large machinery clean, and maintain a clean environment

There are many seals and filters in place on heavy machinery to keep working parts clean and free of contamination. Seals should be inspected regularly to make sure they're in good condition. Filters should be inspected and changed regularly. Breathers should be kept clean to avoid creating a vacuum in the cab which will suck contaminants into the cab. The electronics in the cab are susceptible to breakdown if contaminated. This impacts the clutch, for example.

Large machinery should be stored in a shed or other building if at all possible. Exposure to wind and weather can lead to rust and rot. The machinery should be run periodically if it is not in use.

5. Have a maintenance and repair schedule, and keep good records

Fluids, tires, tracks and electrical systems are among the components that have to be checked regularly for preventive maintenance. Know what needs to be inspected and when. Here are some examples.

- Power transmissions have many moving parts that need to be maintained in top condition. Gearboxes need to be checked for lubrication, vibration and damage to parts.
- Friction materials, seals, gaskets and bearings all need to be inspected for wear and replaced. Gears and shafts usually last a long time and don't need to be replaced often, if at all.
- Drive train components need constant monitoring. Check pulleys and v-belts on CVT transmissions for alignment and wear. Check sprockets for correct meshing with chains and for breaks.
- Test the oil to diagnose problems. Change filters frequently.
- Bearings keep great amounts of force running smoothly and are vital to large machinery performance. Check bearing lubrication often. Maintaining bearings well extends their life.
- Lubricate gears frequently.
- Do a seal check to prevent bearing raceway contamination.
- Run torque checks on the bolts. Bolts can elongate and creep over time.

To conclude, following the above 5 steps can significantly extend the useful life of heavy machinery, improving the Return on Investment from these important purchases. In today's global manufacturing world, even greater value can be extracted if you have a global knowledge capture and distribution system such that this knowledge of machinery maintenance can be effectively shared across your organization – letting you reap even greater benefits on a much wider scale.

7 Safety Tips to Reduce Mining Accidents

P.Manoj Kumar Reddy
Deputy Manager (Mines)
Sagar Cements Limited

1. Don't Ignore the Danger

The first step toward keeping yourself safe is to be cognizant of the fact that working in mining is hazardous. Accept that the mining industry is inherently filled with danger and stay alert every moment on the job. Watch out for your colleagues as well and never let your guard down. Accidents with major impact can occur in a moment of carelessness.

2. Dangerous Tasks Require Planning and Communication

When planning tasks, don't think only of completing them as efficiently as possible. Allot extra time and money for safety requirements. Never compromise the safety of your employees when trying to meet deadlines or to boost the quality of work. All risks should be assessed, including the possibility of accidents. Try to eliminate risks as much as possible. Where a risk still exists, provide your team with clear instructions and educate them on how to mitigate it. If necessary, deal with the danger should it arise.

3. Get Professional Training

All team members should undergo regular safety training. This should not just apply to new team members. Even long-standing employees should be made to attend refresher courses. Safety training sessions that contain theory and practical components can be very helpful. Workers who take on strenuous roles may be sent for health and fitness checks to determine whether they are able to take on the physical demands of their work.

4. Always Wear Safety Equipment

There is a litany of safety equipmentthat mining workers use for their protection, from helmets to safety glassesand gloves. It is essential that all workers wear the necessary safety equipment at all times. There have been countless stories of workers being saved by helmets, for example.

5. Supervise Your Team

All team members should follow safety instructions with no exceptions. A supervisor must also be diligent about following up and enforcing the rules. Never allow more people to enter a site than are allowed. Supervisors also need to know the whereabouts of all team members throughout each shift. Likewise, all workers should be kept informed about what their fellow team members are doing throughout the day. Never allow any team members to breach the safety rules without a warning or, in the case of repeated disobedience, appropriate consequences.

6. Document Your Safety Procedures

When accidents happen, all team members should know exactly what to do. Safety procedures must be clearly defined. When documenting the safety procedures, describe the various incidents that might occur, what needs to be done and whom to contact. Safety procedures should be displayed prominently in locations that can be easily accessed by team members.

7. Follow the Latest Safety Standards

Ensure all safety equipment is serviced regularly and satisfies all the latest safety standards. Never try to save on safety equipment. If an item no longer complies with the current safety standards, replace it, even if this means increasing expenses or delaying a project. Never allow staff to use outdated safety equipment, even for a short period of time.

The number of safety-related incidents in the mining industry is high. Unfortunately, some of the tragedies that have occurred could have been prevented. Don't repeat the mistakes that have been made by others. While the risks can never be eliminated completely, following the above tips can help significantly.

"A STITCH IN TIME, SAVES NINE"

G.Mar reddy
Sr.Engineer(Auto˘)
Sagar Cements Ltd

Its a wonderful proverb and in reality it makes sense too. Let's agree to the fact that the improper or bad maintenance is the root cause for shortening the lifespan of the earth moving equipment's. Over and above there are few workers who loose their life or injured badly every year due to heavy earth moving equipment's, often caused by improper training and poor maintenance practices. Since earth moving equipment's are complex in nature there are many things we need to do to keep it functioning safely. It is of paramount importance that only trained and highly skilled personnel operate and work on such equipment's.

Experience gained in this field suggests that we should bear few points in mind in up keeping of such equipment's. Inadequate maintenance certainly affects the safe operation, causes too many breakdowns, demands expensive spares which ultimately results in production loss.

Following few simple methods may be considered for better maintenance for the safe operations of the equipment's :

1. ***Cleaning:*** Keep the equipment's as clean as possible. Accumulated dust, debris generally damages one or more vital parts of heavy machinery which results in expensive repairs. These equipment's are provided with expensive vital seals, rubber rings which are so designed that it does not allow the dust / dirt to enter into the systems. Now we can imagine, if such seals / rubber rings are accumulated with fine dirt particles, it leads to crack of rubber items which further leads to entry of foreign particles into the system. This small tip creates a havoc in the entire operation if not taken care of. Breathers and filters must be kept clean always. Any small leak if observed, suitable appropriate measures has to be taken to prevent or arrest the leak. If the equipment/s are kept open for a longer time, it is advisable to park such machines under a roof or cover them to prevent rusting, grime build ups etc. We should never forget to clean the equipment's with the solutions that are recommended by the OEM only as few chemicals are very hard and carries every potential to damage the rubber parts. We rightly say that prevention is always better than the cure.

2. ***Training:*** Train and retrain the existing employees, while, train the new employees thoroughly. The equipment's may be liable to get damaged or there could be severe incidences if the persons who are operating and working on it are not trained to the current standards. Experience says that, generally we forget or give least priority on training's. If this is true...then we may experience some serious breakdowns or serious incidence which is least desirable in any mines. The qualified Engineers must and should do the risk assessment after going through the machinery and make doubly sure there is no risk involved in operating and as well as working on such machines.

3. ***Lubrication:*** We all know that if the moving parts causes friction which can severely damage and hence has to be lubricated regularly as prescribed in the manual. In any case, if it is not lubricated regularly, the life span of that particular moving parts will be drastically come down. This is a kind of a vicious circle in which we easily fall trap. In most of the places it has been have seen that due to short of time and due to excessive demand on production, we tend to skip this activity which at a later date will cost enormous.

4. ***Maintenance:*** It's unsafe to operate the equipment's which are either not maintained or badly

maintained. As the proverb goes : "A stitch in time saves nine", the equipment's should be properly maintained as per the scheduled laid down by the OEM's. The technician who maintains the equipment's should have a thorough knowledge and skills. Inspecting and repairing will not be just sufficient to ensure its fitness. Properly planned and structured check lists should be made available along with SOP / SWP. When making such check lists one should refer the manual and also keep site and operational conditions in mind. This will help to get the best check lists. A proper log book, records for maintaining the history / data has to be maintained. Lots of soft wares are available in the market for up keeping such maintenance records. However small the problems are, must be repaired / rectified at the earliest, else it would multiply and eat your budget. Technician should also inspect for the hidden problems in the equipment's. This would be a tedious job, but needs to be done judiciously without any compromise.

5. ***Wear and Tear:*** There exists many wear and tear parts in all of the equipment's. While the equipment is under operation you may see signs that leads to wear and tear. Now this is the alarm when we have to act upon, else at a later date this can cause the machines to malfunction. We have to learn to rectify the issues at the earliest possible time instead of waiting for long shutdowns etc.

6. Safety: All earth moving equipment's must and should have guard rails placed to avoid any injury in the case of any eventualities. Machines should be parked in a safer area with cones placed around them as an indicator. No person should go near the moving equipment's when they are in motion / operation. Operators and technicians should be properly trained how to avoid falling off earth moving equipment. Let the technician possess the right tools with him. Right tools play an important role during repairing or maintaining. This reduces a great risk of injury to the person who is on the job. Never ever try to alter the design of the equipment without the consent of the OEM. There are many incidences and side effects notices at various sites where equipment tampering have been made.

RISK ASSESSMENT OF OPENCAST LIMESTONE MINE

P. Manoj Kumar Reddy
Deputy Manger (Mines)
Sagar Cements Limited

1. Risk Identification

Following scenarios fall under Maximum Credible Accident Scenario:

- Fire in Diesel tanks / vehicles
- Accidents due to explosives storage / blasting
- Accidents by Heavy Earth Moving Machinery (HEMM)
- Mine Inundation during heavy rainfall / cloud burst
- Failure of mine benches

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.

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 such as control blasting and use of geo textile mat can minimize the damage to some extent.

Accident by 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 tire edge may results in injury and equipment damage.

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

Mine Inundation during Cloud Burst: 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 800 to 1100 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.

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

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:

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. Besides, sufficient number of water hydrants with sufficient hose pipes will be made available in the surface for fire protection.

Slope Failure: 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 maintained *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.

Blasting: To ensure safe blasting following measures will be adopted:-

1.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.

2.Use of ground vibration and air blast monitoring instrument to monitor the blasts. The instrument reveals efficiency of the blasting activity.

3.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.

4.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.

5.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.
Heavy earth moving machineries: All the accidental scenarios due to HEMM will be

minimized ensuring following mitigation measures:-

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

Sabotage of Explosives: Suitable explosives van duly licensed by the Controller of Explosives will be 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 1884 & Rules, 2008. The entire magazine area is fenced by high chain links with barked wire at top. Security guards will be provided for surveillance of the area around magazines. The storage and maintenance of stock records for all the magazines will be done by an authorized magazine in-charge under the guidance of blasting engineer. The magazine will be kept under lock and key and guarded by security person round the clock. Necessary foolproof arrangements will be made for transportation of detonators in separate vehicles to the blasting site.

Mine 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.

3 Disaster Management Plan

A major emergency in a work is one, which has the potential to cause serious injury or loss of life. It may cause extensive damage to property and serious disruption both inside and outside the work. Emergency may be caused by a number of different factors, e.g. fire, explosion etc.

The aim of disaster management plan is concerned with preventing accidents through good design, operation, maintenance and inspection. An important element of mitigation is emergency planning, i.e. recognizing accidents as soon as possible, assessing the consequences of such accidents and deciding on the emergency procedures, both on-site and off-site, that would need to be implemented in the event of an emergency. The overall objective of the disaster management plan is:

a) To localize the emergency and, if possible eliminate it; and
b) To minimize the effects of the accident on people and property

In order to take care of above mentioned hazards/disasters the following control measures will be adopted:

1. All safety precautions and provisions of Mine Regulation Act and DGMS will be strictly followed during all mining operations;

2. Entry of unauthorized persons will be prohibited;

3. Firefighting and first aid provisions in the mines office complex and mining area will be ensured;

4. Provisions of all the safety appliances such as safety boots, helmets, goggles, ear plugs/muffs etc. will be made available to the employees;

5.Training and refresher course for all the employees working in hazardous premises;
6. Working of mine, as per approved plans and regular updating the mine plans;

7. Cleaning of mine faces will be regularly done;

8. Handling of explosives, charging and blasting will be carried out by competent persons only;

9. Provision of magazine at a safe place with fencing and necessary security arrangement;

10. Regular maintenance and testing of all mining equipment as per manufacturer guideline;

11. Increasing the awareness of safety and disaster through competitions, posters and other similar drives.

Organization for dealing with the emergency situations has been prepared. Co-ordination among key personnel and their team has been shown in Fig 6.1. The emergency organization will be 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 will be two teams for taking care of emergency situation- Firefighting 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.

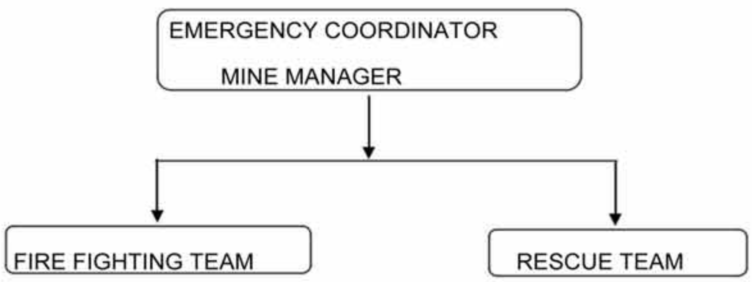


Figure 1: Organization for Dealing with Emergency Situations

3.1 Roles and Responsibilities of Emergency Team

Site Main Controller (SMC): The SMC or emergency leader shall assume absolute control of site and shall be located at SECR.

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.

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.

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 firefighting shall be included in search and rescue team.

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/Defense representatives etc.)

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

3.2 Other 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
Police Department: District Superintendent of Police, SHOS of nearby Police Stations

e) Public Health Department:
- District Medical Officer
- Residential medical officers of PHCs in a radius of 3 km around mine site

f) Local Community Resources
- Regional Transport officer
- Divisional Engineer Telephones

g) 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.

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 firefighting 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.

Site Main Controller will be directing and deciding a wide range of desperate issues. In particular SMC has to decide and direct:

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

4. Whether missing staff members are to be searched or rescued.

- 5. Whether off-site emergency plan to be activated and a message to that effect is to be sent to district head quarter.
- 6. Whether and when district emergency services are to be called.
- 7. 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:

- 1. 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.
- 2.Inspection of other parts of site which might have been affected by impact of incident
- 3.Inspection of personnel collection and roll call centers to check if all persons on duty have been accounted for
- 4. 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-centers and will finally declare and communicate termination of emergency and authorize 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

- 1.District Fire Personnel
- 2.District Hospital Ambulance and Staff
- 3.District Administration
- 4.Factory Inspectorate and Labor Commissioner
- 5.Officers of State Pollution Control Board
- 6.Insurance Authorities
- 7.Directorate General of Mine Safety
- 8.Chief Controller of Explosives/ PESO

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.

3.4 Fire Extinguishers

The following types of fire extinguishers shall be provided in office within the mine premises:

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:

- 1.Gas mask respirators
- 2.Fire proximity suits
- 3.Torches
- 4.Axes/hand saw
- 5.Fire entry suits
- 6.Fire blankets
- 7.Ropes
- 8.Ladders
- 9.Rubber glove
- 10.Blanket
- 11.Rubber shoes or industrial shoes

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 during disaster.

3.6 Actions to be taken on hearing the Warning Signal

On receiving the disaster message following actions will be taken:

1. 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.

2. The persons from other sections will report to their respective officer.

3. The concerned section will take immediate action to remove contractor's personnel outside the mine gate.

4.Alert signals will be given to the residents of surrounding villages.

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 SLC 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 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.

SAFETY

Smt. V. Lavanya
W/o. Shri. V. Sreenivasulu
Chief General Manager (Inst)
Sagar Cements Limited

I. INTRODUCTION

We can define safety as a condition of being protect against physical, psychological or other types of consequences of failure, damage etc., which is considered non-desirable.

It can also be defined to be the control of recognized hazards to achieve an acceptable level of risk. Sustainability can be defined as the one which can able to be maintained at a certain role or level of consistency. So, this easy deals with how the future generations of life can be maintained through safety.

II. DESCRIPTION

Almost, in every aspect of our life safety place a major role. As a human being it is our prime responsibility to learn how to safe from the entities (Physical or mental) in and around us, otherwise things and situations may go wrong.

III. HOW TO CULTIVATE SAFETY

1. Effective leadership is required it is a key feature of a positive safety culture as it determines how everybody else in the society will act upon the safety issues.
2. Strategic planning is required and these must be converted to actions.
3. As a effective leader we have to encourage people to make decisions on their own. So that they themselves can understand the importance of safety.

IV. SAFETY AND ITS IMPORTANCE:

A safe situation is the one where risks of injury or damage is low and manageable suppose if a person has unsafe behavior then he may die in accidents or of any other health issue. That means here the person is not aware of road safety and he is not aware of his health as per the above examples because of his laziness. So, if the entire society has unsafe behavior, life may or may not exist in future. Human race disappears and also sustainability will be affected. As per the words of APJ Abdul Kalam "Let us sacrifice our today so that our children can have better tomorrow." That sacrifice comes from our discipline and character and awareness of safety.

V. CONCLUSION :

Thus safety plays a major role for the future generations to survive. It may be of physical, mental, financial, and environmental or others. It ultimately leads to sustainable chain of generations (Lives)

SAFETY MANAGEMENT SYSTEMS AND FUTURE CHALLENGES IN INDIAN MINES

C.V.Ramanaiah,
Sr.Manager-Mines
M/s.Penna Cement Industries Limited,Tandur

General

Mining is a core industry that exists from the ancient age. Its importance for the growth of the nation need not be over emphasized. Though, India has been endoured with rich mineral wealth, its exploitation is limited due to economical, technical, and environmental and safety considerations.

Mining has always been one of the most hazardous activities compared to other industrial sectors. Fatalities and disabling accidents are higher than other industrial activities. The hazardous character is due to the multitude of specific risk factors in the continually changed work environment.

In early days mining in India, many accidents were termed "Act of God" – and perhaps the mining community accepted the fact that accidents will happen and it is part of job. I believe that there are still number of managers and miners in India who consider that an accident is sheer 'bad luck'. However, with time we have learnt that accidents just don't happen they are caused. Over the years we have made many significant changes the way we conduct mining. Today, mining required even higher safety standards that are acceptable to the workforce and the community. Any fatality or serious injury needs to be considered seriously.

Due to increasing awareness of the mine workers and pressure from Government, employees and community groups; the need to improve safety, health and environment functions has emerged as a priority issue. New trends in mining coupled with social demands have created the need to redefine the way in which safety and health functions in Indian mines.

Although mining activities are regulated by the Mines Act, Rules & Regulations prescribing safety and health standards, the hazards are due to either violation of standards or their lack of comprehensiveness. The lack of comprehensiveness derives from the fact that they can only include small part of human behaviour in relation to the daily risk situation.

To improve the safety standard in the mines a lot of effort has been put in to make the work place safe and secure from the risky environment. In spite of gigantic effort in terms of improvement in techniques, skill of man power, multitude supervision and standards of safety equipments, accidents continue to occur taking precious human lives and loss of property.

1. Root Cause of Accidents:

Analysis of these accidents indicates that the root causes could be attributed:

1. Poor Risk Management
   a. Absence of Identification of Potential Catastrophic Hazards
   b. Hazards not identified of recognized, Risk not controlled
   c. Risk was inherent in task or procedure
   d. Risk was ignored, Tolerated, accepted, Normalized-Abnormal events became Normal
2. Quality & Experience of supervision
   a. Unsafe practices
   b. Unsafe Act Tolerated of encouraged
3. Poor Safety Culture
   a. Bad news not communicated upwards
   b. Belief in margin of errors

4. Absence of disciplined system

2. **Causes of Failure:** Common causes for the failures indicate the following:

   - Absence of Standard Work Practices & Procedures
   - Changes & maintenance of systems subsequent to change
   - Frequency of Inspections by senior personnel
   - High Staff Turnover (Casual Worker)
   - Production culture & Pressures to the detriment of safety Incentive schemes Negative result in avoiding risk or incentive to do job in risky way.
   - Belief that safety is simple common sense

3. **Risk Assessment and Safety Management Plan:**

One must understand that '*effective health and safety management in no 'common sense' but is based on a common understanding of Risks and how to control them brought about through good management'*.

Keeping this in view a recommendation was made during the 9th Safety Conference held on 2nd & 3rd February 2000 at New Delhi to initiate formal Risk Assessment as tool for development of appropriate health and safety management systems.

Lessons learnt from accidents in Indian mines reveal that the existing traditional system of administration of Mines Act and subordinate legislation framed there under, through inspections, statutory and other investigations into fatal accidents dangerous occurrences and follow up measures arising out of the traditional approaches to ensure that risk is kept within acceptable levels have reached its limit of effectiveness. Time is now ripe to introduce new initiatives and stress upon arrears of high risk in order to bring them down to acceptable risk levels. This can be achieved by introducing the concept of "Risk Assessment" and "Safety Management Plans", the concepts which are now being widely accepted and practiced in advanced countries.

Basic purpose of Health and Safety Management is to create a mechanism involving all concerned at every level by which dangerous events and accidents may be prevented. This system differs from the existing one by a necessity of the entire staff being involved in realizing health and safety improvement programmes with responsibility sharing. Health and safety management systems include well documented modules of safety management method in form of action procedures in all levels of management and decisions making. Health and Safety Management systems may be defined a **"an auditable documented system that forms part of the overall management that includes organisational structure, planning activities, responsibilities, practises, procedures, processes and resources for developing, implementing, achieving, reviewing and maintaining a safety and health policy of a company".**

Because of the inherent hazards as a activity, and the complexity of mining machinery and equipments and the associated systems, procedures and methods, it is not possible to be inherently safe. Regardless of how well the machinery and methods are designed, there will always be the potential for serious accidents. It is therefore not possible for any external agency to ensure safety of an organization such as a mining company, nor the machinery or methods it uses. The principal responsibility for the safety of workers employed in mines rests with the management of that mine.

It is now widely accepted world over that the various techniques of risk assessment and risk management contribute greatly toward improvements in the safety of mining operations. Considering the accident scenario in India, it has now become essential that risk assessment be undertaken of all hazardous operations, equipment and machinery, taking account of the procedures used, maintenance, supervision and management.

Introduction of risk management as a tool for development of good wealth and safety management system is a breakthrough in the tradition strategy as it differs from the existing one by a necessity of the entire staff being involved in the realization of safety improvement programme with responsibility and accountability sharing proportionate to the decisions making authority. The system is sure to be an effective tool for improvement of health and safety scenario in our mining industry. Risk assessment process will identify hazards existing in the work environment and in all operations, assessment of risk levels of these hazards, determination and prioritization of necessary preventive action ensuring safer and better workplace.

Further, the monitoring the auditing at regular interval recommended as a part of the system would ensure that safe operating procedures, evaluated, corrected, standardized and documented, training procedures for workers and executives are in place and are carried out regularly, and commitment to health and safety is demonstrated at all levels of the organizations. On implementation of the system, an appropriate safety level in each stage of operation may be obtained by a systematic and documented management system with well-defined responsibility and accountability for safety among the mine employees.

Improving safety is subject to the law of diminishing returns. Major gains of the past means that now need to put much more efforts towards creating a better and safer mining environment. The methods of hazard identification, risk assessment and creating safety management plans are tools that are available to the managers, supervisors and operators throughout the industry. These are pro-active tools designed to prevent the hazard or uncontrolled energy from causing damage to people, equipment, or the environment, and to improve productivity. They use a participative approach, developing responsibilities for identification and assessment to those most likely to be affected by the hazard. Each one of these systems relies, to a major degree on participation by the whole workforce. Commitment from the top and active contribution of the employees is a prerequisite for the success of these systems.

4. SAFETY AND HUMAN BEHAVIOUR ASPECTS

Psychological analysis of accidents has shown that they do not just happen by chance. Rather, they can be considered as being brought about by certain preceding circumstances and events, some of which may be associated with human beings, some by situational factors. Therefore, depending upon circumstances or purposes, accidents have been defined in various ways. According to Heinrich (1959) an accident is an unplanned and uncontrolled event in which the action or reaction of an object, substance, person, or radiation results in personal injury or the probability thereof. He also points outs that about 98% of the accidents are such where causes can be determined and which can be controlled. Thus only about 2% of the accidents are accidental and they can be attributed to chance.

Behavioural scientist knows that human behaviour has a cause, and accident behaviour is no exception. A close examination of causes of accidents reveals two general categories – unsafe conditions and unsafe act. Unsafe conditions involve some aspect of the physical environment which sets up or makes probable the occurrence of an accident. Cluttered arrangement of machinery, poor lighting, unguarded moving parts, speed of work, severity of work, length of the work period, fatigue, and oily floors are examples of unsafe conditions. Unsafe acts are those behaviours which lead to an accident or these failures in performance which result in an accident. Health and physical defects, experience, age, sex, personality, impulsiveness, risk-taking behaviour, and emotional instability are the examples of human factors in accidents. All these factors reside within the individual; they make up the so called "human element", and therefore, we call them human factors. Unsafe acts and unsafe conditions, however, interact in such a way that an accident appears to be caused by both. Since unsafe conditions are well known to engineers, we shall pay attention to some of the important personal factors which are well known to psychologists.

The enhancement of personal safety in mines required an understanding of the hazards and their control. Further, it required critical evaluation and application of various approaches to control hazards. The early research for control hazard was mostly directed towards quantifying accident data, very often mine fatalities, according to frequency, severity and incident rate and identifying curative approaches through such avenues as machine modifications, job design and miner training. Recent research, however, has directed attention to the use of system safety tools analyze the safety of mining systems. In recent years, much research has been performed to prevent accidents/injuries through the application of human factor approaches and identification and elimination of human behaviour related causes of accidents.

Human error was identified as the major causative factor in mine accidents in a study by the U.S.Bureau of Mines (Shaw et al, 1989). They studied underground mining accidents to determine the relative contribution of various system factors including human errors. They considered various causal factors such as:

(i)management, (ii) environment, (iii) work task, (iv) equipment design, (v) worker/co-worker characteristics and (vi) human error, and concluded that which few accidents were caused by a single factor, human error was the most significant contributing factor and accounted for 93% of the total accidents.

Human error is considered to be an event that can anywhere in the system. It can be defined as "an inappropriate or undesired human decision or behaviour that reduces or has the potential to reduce effectiveness, safety performance". Human error can be classified stressing the importance of perceiving and recognizing workings about hazards in the work environment. Analysis of accidents in South African Gold Mines has suggested the following classification.

	Human error	Cause
(a)	Failure to perceive a warning	Inadequate inspection technique Negligence in inspection Masking, noise Inadequate information Mixture of these
(b)	Failure to recognise a perceived warning	Lack of training
(c)	Underestimation of Hazard	Lack of experience, cause not known
(d)	Failure to respond to a recognizes warning	Under estimation of Hazard
(e)	Responded to a warning but ineffectively	Negligence or carelessness Standard practice inappropriate direct action others

Percentages of accidents assigned to this classification of error as suggested by Lawrence are as follows:

A	36%
B	4%
C	25%
D	17%
E	14%

Safety and human behaviour aspect needs to be given importance in Indian mines to identify its share of importance in causing an accident.

5. ROLE OF DGMS

Under the Constitution of India, safety, welfare and health of workers employed in mines are the concern of the Central Government (Entry 55 – Union List –Article 246) the objective is regulated by the Mines Act, 1952 and the Rules and Regulations framed there under. These are administered by the Directorate General of Mines Safety (DGMS), under the Union Ministry of Labour. Apart from administering the Mines Act and the subordinate legislation there under, DGMS also administers a few other allied legislation, including the Indian Electricity Act.

Since mining is beset with many inherent hazards, detailed precautions have laid down in the Mines Act and the Rules and Regulations framed there under to guard against dangers in mines and it is the responsibility of the mine management to comply with the same. While the onus of providing for and ensuring safety in mines rests fundamentally with the mine managements, as clearly laid down under section 18 of the Mines Act, 1952, the DGMS has the responsibility to see that the safety statute is kept updated to absorb the technical advancements as well as to make the same comprehensive, practicable and legally sound and also to carry out periodic inspection of mines to oversee compliance of safety laws. The Mines Act and the subordinate legislations framed there under is periodically update for the purpose.

Apart from functioning as regulatory body, DGMS also works as facilitator for advising management in respect of technical feasibilities and safety aspect through their vast experiences in different fields. They also initiate many safety promotional activities for the benefit of miners at large.

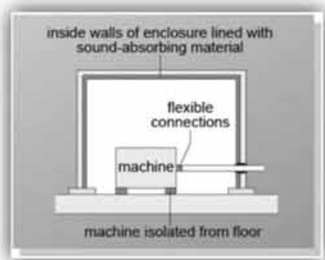
ధ్వని ప్రేరిత వినికిడి సమస్య - నియంత్రణ వ్యూహాలు

డి. కళ్యాణ్ చక్రవర్తి, ఎం. టెక్, ఎం.బి.ఎ

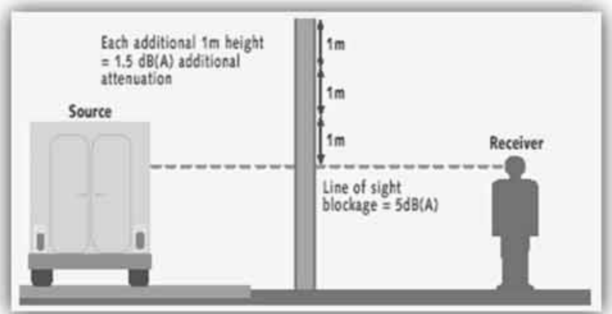
ఏ.జి.యం. (మైన్స్), డెక్కన్ సిమెంట్స్ లిమిటెడ్.

ప్రపంచ జనాభాలో 5% కంటే ఎక్కువ మంది (466 మిలియన్లు) వినికిడి సమస్య ను కలిగి ఉన్నారు. ప్రపంచ ఆరోగ్య సంస్థ అంచనాల ప్రకారం, 2050 నాటికి 900 మిలియన్ల మంది అంటే ప్రతి పది మంది లో ఒకరు ఈ సమస్యకు లోనవుతారు. ఉపరితల సున్నపు రాతి గనులలో కార్మికులు ఎదుర్కొనే వృత్తిపరమైన ఆరోగ్య సమస్యలలో ఇది అతి ముఖ్య మైనది. ఈ సమస్య ను అధిగమిచడంకి అంతర్జాతీయ కార్మిక సంస్థ ఈ క్రింద తెలిపిన వ్యూహాలను సూచించింది.

1. ఏవరైనా కార్మికుడు పరిమితికిమించిన ధ్వని కాలుష్యానికి లోనవుతుంటే, వీలైనంత సాంకేతిక మరియు పరిపాలన నియంత్రణ ద్వారా అతని ధ్వని మోతాదును తగ్గించాలి మరియు వినికిడి సంరక్షణ కార్యక్రమంలో అతన్ని చేర్చాలి. వినికిడి సంరక్షణ కార్యక్రమం లోని చర్యలు
    - i) వినికిడి శక్తి పరీక్షలు చేయడం
    - ii) వినికిడి శక్తిని కోల్పోవడం పై శిక్షణ మరియు అవగాహన తరగతులు నిర్వహించటం
    - iii) ప్రభావవంతమైన వినికిడి రక్షణను ఏర్పాటుచేయడం.
    - iv) నిరంతరం ధ్వని గురికావడాన్ని గుర్తించేందుకు అదనపు ధ్వనిని కొలిచే విధానాలు వినియోగించడం
    - v) ధ్వని స్థాయిని తగ్గించే విధానాలు మరియు నియంత్రణలను పరీక్షించడం.
2. ఏదైన కొత్త పద్ధతి మరియు యంత్రం, విషయంలో సాధ్యమైనంత వరకూ
    - a) ఉత్పాదకత అవసరాలను తెలుపడంతో పాటు, ధ్వని పరిమితులను కూడా తెలియజేయాలి.
    - b). ధ్వని తీవ్రతను వీలైనంత తగ్గించే విధంగా పని ప్రదేశాన్ని అమర్చుకోవాలి.
3. అప్పటికే వినియోగంలో ఉన్న పద్ధతులు మరియు యంత్రాల విషయంలో, ముందుగా వాటి అవసరం ఉందా లేదా వేరొక రకంగా చేయడం వల్ల ధ్వని పరిమాణాన్ని తగ్గించవచ్చా అనేది పరిశీలించాలి. ధ్వనిని కలుగచేసే విధానాన్ని పూర్తిగా తొలగించలేనప్పుడు, అందులో ధ్వని కారకమయిన భాగాలను నిశ్శబ్ద ప్రత్యామ్నాయలతో మార్చడానికి ప్రయత్నించాలి.
4. పైన తెలిపిన పద్ధతి సాధ్యపడనప్పుడు, ధ్వని కారకాన్ని గుర్తించి, ధ్వని తయారయ్యే చోటనే దానిని నియంత్రించాలి. దాని వలన ప్రకంపలను కూడా తగ్గించ వచ్చు.
5. ధ్వనిని, అది ఉత్పన్నమయ్యే చోట నియంత్రించలేనప్పుడు దానిని ఒక ఆవరణలో మూసి వేయడానికి ప్రయత్నించాలి. అయితే అలా మూసి ఉంచేటప్పుడు, ఉత్పాదకత అంశాన్ని కూడా పరిగణించాలి. ఆవరణలను రూపొందించేటప్పుడు అన్ని అంతర్జాతీయ ప్రమాణాలను పరిగణించాలి.



6. ఆవరణలతో ధ్వనిని నియంత్రించలేనప్పుడు, అడ్డంకి ఏర్పర్చడం ద్వారా ధ్వని విపత్తులను తగ్గించాలి. ఈ ఆవరణలను ఏర్పరచేటప్పుడు ఆ ప్రదేశపు ప్రత్యేక పరిస్థితులలో పాటు, ఇతర ప్రమాణాలను పాటించాలి.



7. పై విధానాలతో నియంత్రించలేకపోతే, తప్పనిసరిగా ఈ క్రింది విధానాలను ఆఖరి ప్రయత్నంగా చేయాలి.

    1. తక్కువ వైశాల్య స్థలంలో పని చేసే వారికి ధ్వని ఆశ్రయాన్ని కల్పించాలి.
    2. పనిలో మార్పు చేయడం ద్వారా మరియు పనికాలాన్ని తగ్గించడం ద్వారా ధ్వని మోతాదును తగ్గించాలి.
    3. పనిప్రదేశాలలో పరిమితి లో లేని ధ్వని ని సూచించే హెచ్చరిక గుర్తులను ఉంచాలి.
    4. ధ్వని నుండి రక్షించే పరికరాలను అందజేయలి.

	
ఇయర్ మఫ్స్	ఇయర్ ప్లగ్స్

ఇయర్ మఫ్స్ మరియు ఇయర్ ప్లగ్స్ రెండింటిని కలిపి ధరించడం వల్ల మరింత మెరుగైన ఫలితం ఉంటుంది.

8. చెట్లు పెంచడం ద్వారా ధ్వని నియంత్రణ

చుట్టూ చెట్ల తో అడ్డంకిని నిర్మిచడం వల్ల ధ్వని పరిమాణం తగ్గడమే కాకుండా పని ప్రదేశం అందంగా కూడా తయారవుతుంది. కొన్ని మాత్రమే పెద్ద చెట్ల కన్నా చిన్న చిన్న చెట్లు చాలా ఉండడం వల్ల ఎక్కువ ప్రభావం ఉంటుంది. వెడల్పు ఆకులు గల సతత హరిత చెట్ల ను వినియోగించడం వల్ల మంచి ఫలితాలు ఉంటాయి.

పైన తెలిపిన వ్యూహాలను ఉపయోగించి ధని కాలుష్యాన్ని నియంత్రించి గని కార్మికుల వినికిడి శక్తి రక్షించ వలసిన భాద్యత అందరిపైన ఉంది.

***

SK. JANI BASHA
Elect. Dept., సాగర్ సిమెంట్స్ లిమిటెడ్

భద్రతా కవిత

1. చీకటికి చురక పెడుతుంది
చిన్న మిణుగురు పురుగు. మొండ వాన్ను
ఆపుతుంది
రుండు మూరాల గొడుగు దూరాన్నన
చెరుపుతుంది
చిన్న చీమల బారు

దురట

నల్లను తరుముతుంది భద్రతా కుంచమైనా చాలు

2. కరగన్నదే కప్పవో కి కవ్వో తీరికి కుంత్త ఎలా పుడుతుంది
మరగన్నదే నీరు ఎలా మబ్బు రూపు కడుతుందని
కలు కురన్నదే అడుగు ఎలా నటన రకి కడుతుంది శిల్పి
చెక్కక న్నదే, శిలలి మెలా పుడుతుందని.
భద్రతను చాటించని, పాటించక పోతే
భద్రుంగా ఎలా ఉంటావు?

3. రాపిడి లేకుండా వజ్రం మెరుసోదుందా
అలలు అలరడి లేకుండా సముద్రం సీనలుసోదుందా.
పన్నసలు లేకుండా, సంగీత నాదం పలుకతుందా
కృషిలేకుండా మనిషి ఋషి అవుతాడా ?
భద్రతా పరికరాలు ధరించకుంటే నీ భద్రతక భరోసా ఉందా ?

INDUSTRIAL SAFETY (or) MINES SAFETY

G. RAJASHAKAR REDDY
S/o. G. KONDA REDDY
M/s. MY HOME INDUSTRIES PVT. LIMITED

Safety is very important aspect for any industry as an accident free work environment boosts the morale of the team members working in any hazardous situations. Recognizing these facts industries involving various hazards & risks industries prepare their own safety policy, safety manual & have a separate section for safety so as to create proper awareness & provide the know-how-about the safety.

Safety means continuing & healthful living without injury. Safety is freedom from garm. The work safety also refers to the precautions people take to prevent accidents, harm, danger, damage, loss & pollution. Safety also deals with improvement in working conditions for better health. Management is responsible to provide safe working condition & individual's safety.

It is not only sufficient to care of safety but other 2 inter-related aspects viz., health & environment are also given equal importance.

Losses due to accidents in Industries (or) Mines:
1. Loss of time of the injured person.
2. Loss of time of supervisors.
3. Loss due to damage caused to machines.
4. Loss due to the reduction in the efficiency of other workers due to fall in their morale.

Causes of Accidents in Industries (or) Mines:
Majority of accidents are due to transmission machinery.
1. Accidents due to dangerous machines.
2. Unsafe physical condition.
3. Loading machines beyond capacity.
4. Not using safety devices.

Factors Responsible for Industrial Accidents:
1. Age
2. Experience
3. Fatigue
4. Rate of Production

Measures for Preventing Accidents in Industries:
1. Safe workplace & working condition.
2. Safe material handling
3. Personal Protection Devices.
4. Safe Activities of the organization

General Precautions to Prevent Accidents:
1. Always remain alert & in proper physical & mental condition.
2. Keep hands away from moving parts such as v-belt, gars, drive shafts etc.
3. Keep machine & area clean.
4. Always keep guards & covers in position while operating a machine.

Safety Education & Training:
1. Induction Training
2. Refresher Training
3. Specific Training
4. Specific worksite hazards

Safety Programme:
1. Safety Awareness.
2. Safety Implementation
3. Safety Programme Maintenance

Factors Affecting Industrial Safety:
1. Equipment related factors.
2. Work area related factors.
3. Environmental factors
4. PPE; Personal Protection Equipment

SAFETY AND MINING MACHINERY

K.SRINIVASA RAO
Manager (Mines)
Parasakti Cement Industries Limited

The mining industry has developed machine safety programs with interventions and control technologies to reduce injuries to personnel working near machinery and mobile equipment.

Machine safety programs attempt to understand the machine system requirements and specifications and to address the human interface issues involving the operation and maintenance of the equipment.

Mining companies are also steadily introducing their preferred safety systems across global operations. Because of the individual nature of mines, a one-size-fits-all solution is difficult, so some form of harmonized corporate standards is more likely than product-specific mandates.

In this section we would like to discuss the dangers in operating heavy machinery and share advice to enhance the safety of those mineworkers operating machinery.

Accidents with Mining Machinery

Researchers at the National Institute for Occupational Safety and Health in the US studied mining accidents that involved workers entangled in, struck by, or injured in contact with machinery or equipment in motion. Machine-related accidents account for many of the severe accidents in the mining industry.

Machinery and Mining Operations

What types of machinery are operating on our mining premises?

Heavy machinery needed in mining for exploration and development, to remove and stockpile overburden, to break and remove rocks of various hardness and toughness, to process the ore and for reclamation efforts after the mine is closed.

- Bulldozers, drills, explosives and trucks are all necessary for excavating the land.
- Large drills are used to drill the holes, and obtain samples for analysis.
- Trams are used to transport miners, minerals and waste.
- Huge trucks, shovels and cranes are employed in surface mining to move large quantities of overburden and ore.
- Processing plants can utilize large crushers, mills, reactors, roasters and other equipment to consolidate the mineral-rich material and extract the desired compounds and metals from the ore.
- Conveyors, , and haulage equipment such as trucks and loaders.

What are the contributing factors to accidents with machinery?

- Large, powerful moving machinery processing thousands of tons of ore and rock in poorly lighted and confined work areas in surface mines, and in adverse weather conditions in surface operations, contribute to the hazardous nature of mining.
- Improper operation of the machine and maintenance and repair.
- Poor visibility near mining equipment, machinery entanglements, slipping and tripping, operator error, and hazards associated with equipment maintenance.
- Ineffective safeguarding of workers near machinery through the required mechanical guarding around moving components, lockout/tag out of machine power during maintenance and backup alarms for mobile equipment.
- Poor proximity detection
- Mining machinery and haul trucks have extensive operator blind spots.
- Haul roads are unsealed and need constant maintenance, blind corners are common, and intersections change frequently.
- 24-Hour working and driver fatigue contribute to transportation accidents.

Typical Mechanical hazards include the following

- Crushing
- Shearing
- Cutting/severing
- Entanglement
- Drawing-in/trapping
- Impact
- Stabbing/puncture
- Friction/abrasion

Steps to enhance Safety with Machinery

To decrease accidents researchers recommend additional efforts in the development of new control technologies, training materials and dissemination of information on best practices.

Driver adherence, situational awareness, and proximity detection are all paths to collision avoidance.

TIPS ON ACHIEVING EFFICIENCY AND EOCNOMY IN OPENCAST MINING OPERATIONS

By
Narendra. G
Manager – Mines,
Zuari Cement, Ygl

Introduction:

In our country nearly 60 minerals are mined. Underground mining is confined to a few minerals only. They include barites, coal, copper ore, chromate, gold ore, lead-zinc ores, manganese ore, and mica. Some of these minerals are mined partly by open-cast method also. Rest of all the minerals is mined by open-cast method only. It is proposed to provide some tips only for carrying out open-cast mining in an efficient and economic manner.

Efficient methods imply that the output of men and machinery deployed is maximized. Economy in mining operations implies that minimum inputs are used in the mining operations. Both imply that there is no waste of resources either through misapplication or through misuse. In his context the first aspect to be considered is the lay-out of the open pit. Utilizing the knowledge of rock mechanics the pit may be so designed as to minimize the excavation of waste, and minimize the distance of transport for its disposal. The working width at every bench should be adequate for unhindered movement of machinery. The floor of the benches should be level free of undulations so that vehicles can move at desired speeds and some materials does not spill out from the moving vehicles. Protection of the environment and control of land degradation, and air/water/sound pollution are essential requirements as per environmental laws. These two aspects have to be so planned as to meet the standards required by law and at the same time expenses in this regard are minimized. It would be desirable to consider prospects of creation of new assets such as forest products from afforestation or reclaimed land or creation of water bodies in the course of environmental protection measures so that the net costs of thee measures can be minimized.

Opencast Mining Operations:

Open-cast mining operations essentially involve rock-drilling, blasting, loading, mineral processing / benefication and transport operations. Taking in to account the size of mining operations, selection of matching equipment is necessary otherwise their utilization cannot be optimized and working difficulties arise. A brief coverage of these operations includes tips for their efficient and economic performance.

Rock Drilling : Drilling holes of suitable diameter is required to make blast-holes for breaking the rock / mineral for loading. For this purpose usually down-the-hole hammer drills capable of drilling holes of desired diameter ranging from 100 mm to 250 mm may be deployed. The hammer is operated by compressed air and its rotation is provided by the compressed air driven rotary. Motor. The sites at which holes are to be drilled have to be fixed in accordance with the blasting plan. It requires skill on the part of the driller to ensure that the holes are drilled at those very sites. It is important for efficiency and economy.

For efficient and economic operation the compressed air supply should be at the desired operating pressure. Also it must be ensured that the cuttings generated by the hammering action are simultaneously cleared from the hole. To prevent the cuttings from falling back into the hole it is necessary that the hole remains of the same diameter at its collar and does not acquire funnel shape at the top. This calls fro skill in drilling. This is achieved by operating the hammer without making it rotate till it penetrates the rock for a few millimeters. Thereafter rotation may be started and gradually increased.

Failure to flush out the cuttings as fast as they are generated. Usually results in jamming of the drill rods in the hole. The effort put in for releasing the jamming is both time consuming and wasteful of the compressed air. For efficient drilling it is also necessary to pay attention to the drilling edges of the bit, they should not be broken or blunt. Use of Air-line lubrication is necessary for proper functioning of the drill. Use of the dust collectors is necessary for dust suppression and prevention n of air-pollution.

Blasting: for efficiency and economy in blasting operations the following aspects are involved:

(a) Choosing explosives of appropriate specifications taking into account the features of the rock / mineral to be broken.
(b) Ensuring that the blast holes are of the desired depth; directing reflected sun-light inside the hole to see that it is clear of obstruction or cuttings.

(c) Flushing out the cuttings / fallen material by releasing compressed air from a pipe lowered inside the hole.

(d) Designing the blast for best results, the quantity of explosive to be charged, its distribution within the hole, the sequence of detonation

Since explosives form a significant single item of cost of mining operations the selection of explosives, the blast design and proper loading of blast holes are very important factors for the success of the blasting operation. It will be useful to keep records of parameters of each blast and the corresponding yield.

The significance of attention to be paid to blasting is generally not recognized and the operations are left to relatively less qualified staff. This is not conducive to economy. A successful blast contributes to betterment in efficiency and economy.

Loading Operations:

A variety of loading machines of various designs and size-range are available. This includes power shovels, back-hoes, track-mounted or wheel-mounted front-end loaders etc., A judicious choice has to be made of the loading machines keeping the level of excavation in view. For efficient operation of loading machines the blasted materials should be well-fragmented and free of boulders. Generally all the broken materials does not fall of the face; this has to be dug by the loading machine. In case of a successful blast, digging becomes easy for the loading machine. Loading will be efficient if the dumpers can be placed on either side of the loading machine so that as soon as one is loaded, the shovel can turn in the opposite direction to load the other dumper. The operations are most efficient when they are so balanced that neither the shovel nor the dumpers stand idle. The number of dumpers to be deployed with a shovel has to be determined on this basis taking into consideration the cycle time of a dumper for a round trip.

Back-hoe is suitable when loading is required to be done from a level below where the loading machine stands, such as excavating material from a water-filled pond. The back hoe has to stand on solid ground, therefore the material it is required to dig should be diggable. The other factors which determine its efficient operation are similar to those in case of power-shovel.

Where scale of mining is small, a front-end loader may be chosen; it can do light dozing work as well. Unlike a power shovel which dumps material into the dumper as soon as the bucket key is tripped, a F.E. loader pours the materials into a dumper as it tilts its bucket for unloading; thus less sturdy lighter dumpers can be used in conjunction with F.E. Loaders. It can operate in restricted places.

Alternative to Drilling, Blasting and Loading Operations:

Where rock is amenable for ripping and the scale of mining justifies the application of a Ripper-dozer. Both drilling and blasting operations are dispensed with. The ripper presses its tooth or teeth into the rock and moves forward ripping the rock; it moves back and dozes the ripped material into a heap or off to the lower bench. The ripped material can be loaded with a wheel-mounted front-end loader; the operating costs of this loading machine are lowest per tonne as per cubic meters whatever is the unit of measurement of quantity. The cycle of loading is also the shortest among the loading machines of other types. Its movement from one site to another is the fastest.

Drag-lines, which have very long booms in comparison with power shovels, are used to lift loose material and directly dispose it off at a distance thus doing away with the transport operation. Bucket wheel excavators are used in lignite mines in conjunction with belt conveyors; continuously excavated material is loaded on belt conveyor which carries it to final destination.

Transportation:

The transport of waste or mineral is generally done by heavy-duty dumpers with carrying capacities ranging from 15 to 120 tones. For efficient transporting, the roads where the dumpers have to ply should be free of undulation ns and should not yield under load. This is necessary so that the dumpers can be driven at maximum permissible speed and the material may not fall off lest running over the fallen material should damage the tyres. The part of the road which may be of permanent nature may be built with cement. Within the mine area motor grader may be deployed to maintain the roads. The efficient transportation leads to substantial economy.

General tips for efficiency & economy:

Operation and maintenance manuals supplied with every machine provide full information on these aspects; they indicate the dos and don'ts and enable laying down schedule for preventive maintenance of machinery ands saving in cost of repairs. Adhering to thee scrupulously enables efficient operation of machines and eliminates the possibility of accidental break-downs. The latter are doubly harmful; the indefinite down-time results in loss of production and cost of repairs is also generally high.

Due to normal wear and tear certain parts of machines require replacement or repairs. To minimize down-time of the machines, it is advisable to remove and replace the entire subassembly. The replacement of the spare part or its repair could be done without interrupting production and the sub-assembly may be made ready for replacement on the next such occasion.

Tyres constitute a significant costly item of continuous wear. Care has to be taken to prevent their premature failure; maintenance of specified pressure at all times reduces its wear and tear. Rotation in their position periodically leads to even wear. Taking off for retreading before they wear out to an extent which may render them unfit for retreading increases overall life. Retreated tyres should be fitted only toe hind wheels; always keeping new tyres in the front because on accidental failure of the front tyres the dumper may go out of control and may cause accident. Use of retreaded tyres improves profitability.

Fuel is another major item of cost. To economize on fuel consumption, well-maintained machines enable saving in fuel consumption. To prevent loss of fuel through spitting from the breather the topping up of the fuel may be done leaving the fuel tank empty by a few liters. As a precaution against pilferages, the frequency of re-fuelling may be minimized keeping in view the fuel tank capacity and the average daily consumption. A systematic record of fuel consumption of all machinery may enable comparative study of performance of each machine and pin-point ones which need investigation or attention.

Use of good-quality and durable protective safety equipment is conducive to efficiency and economy. It not only prevents the possibility of accidents but also maintains high morale. Accidents are doubly costly. They cause stoppage or slowing down of production and lead to unforeseen expenses on treatment of injury compensation to the injured and repair of damaged machinery etc.

Above all, the human factor is most important for attaining efficiency and economy. A motivated work-force work more efficiently and take care to avoid waste of inputs; it translates into higher efficiency and economy. This factor alone can be a subject of another detailed note.

It is hoped that the above this will be useful to the young mining engineers stepping into their professional careers. They may be able to give a good account of their ability to attain high levels of efficiency and economy in operations under their charge.

Design of controlled blasting (pre-splitting)

A case study in Golegohar iron ore mine, Iran

Mr.Ram Laxman, Asst. Manager (Mines),
M/s. NCL Industries Limited.

Pre-splitting is a controlled blasting technique with applications in open pit mines. The main objectives of pre-splitting in open pit mining are: preventing/controlling back-break; controlling excessive ground vibrations; and filtering the effects of explosive gases from production blasting. This technique is especially effective in back-break control through providing a separating surface between the main blasting pattern and open pit final walls. In this study, a large open pit mine was the case study for the goal of designing pre-splitting through implementation of direct and cost effective experiments. Three tests were designed and performed at the mine. Back-break was successfully controlled through proper design of pre-splitting based on the results of the experiments.

Keywords: Controlled blasting, Pre-splitting, Back-break control, Open pit mining

Introduction

The main objectives of pre-splitting in open pit mining operations are: preventing/controlling back-break; controlling excessive ground vibrations; and filtering the effects of explosive gases from production blasting. Pre-splitting in open pit mining is performed by arranging a row of blasting holes behind the main blast pattern (production holes). These holes will be blasted before or at the same time with production holes and separate the remaining rock mass from the blasting block (Calder and Tuomi, 1980). This artificially created free surface has been shown to be successful in controlling back-break (Singh *et al.*, 2014). The separating surface attenuates propagation of expanding gases to the remaining rock mass i.e. the final walls (Adamson, 2013). In this method, a buffer row is placed in front of the pre-split to achieve better back-break control. Buffer holes are a row of lightly loaded blast holes in between the production and pre-split holes and are intended to adequately fragment the rock between the buffer row and the final wall without over-break (Workman and Calder, 1989). With regard to securing the desired fragmentation, the blast design is significantly important. However, it must be noted that the fragmentation, too, encounters problems because many factors are out of reach of the blast engineer hence solution seems to be difficult (Monjezi *et al.*, 2009). Design of blast experiments is a method of defining optimal pattern of pre-splitting (Xu and Peng, 2008; Dai, 2005; Ozer *et al.*, 2013). In this study, pre-splitting is tested in Golegohar iron ore complex, Iran. The rest of the paper is as follows: first, the case study is introduced and the results of three sets of pre-splitting experiments are discussed. Finally, the conclusion of the case study is summarized.

Case study

Golegohar iron ore mine is located in southern Iran, 50 km from Sirjan, in southwest of Kerman Province. This iron ore complex includes six known reserves and is one of the largest producers and exporters of iron concentrate in the country; it is mined by open pit mining. It has a measured and indicated reserve of over 1?1 billion tonnes of ore. The Golegohar deposits are situated in a metamorphic complex of probable Paleozoic age with a northwest-southeast trend, known as the Sanandaj–Sirjan zone, which is parallel to the Zagros thrust belt on the southwest, and is bounded on the northeast by the Urmieh–Dukhtar volcanic belt (Moxham and McKee, 1990). The deposits are considered to be of sedimentary or volcano-sedimentary origin, laid down in deltaic or near-shore locations that resulted in abrupt lateral and vertical changes in the sedimentary environment. Subsequent deep burial, folding, metamorphism, and erosion left a group of folded or down faulted magnetite rich deposits as elongated remnants of an iron formation that originally had a broader, perhaps more continuous extent. The mine's metamorphic rocks of Paleozoic consists mostly of gneiss, micaschist, amphibolite, quartzschist, marble, dolomite and calcite types of rocks (Karimi Nasab *et al.*, 2011). Figure 1 illustrates one of the operating pits. Geometry and slope stability factors of the mine are summarised in Table 1. The hole pressure is an important parameter in controlled blasting that was calculated as below (Chiappetta, 2001)

$$P_b \sim 1.69 \,|\, 10^{-3} \,|\, \mathbf{r} \,|\, (VOD)^2 \,|\, (r = r)^{2.6} \qquad (1)$$

1 Open pit mining in Golegohar (Source: "Golegohar." 29u05915.2199N and 55u 19903.2499E. Google Earth)

$$P_b \sim 1{\cdot}69 \mid 10^{-3} \mid 1{\cdot}15 \mid (300 \mid 3{\cdot}28)^2 \mid (0{\cdot}24)^{2{\cdot}6}$$
$$\sim 4603{\cdot}9\,psi$$
$$\sim 4603{\cdot}9 \mid 6{\cdot}895 \mid 10^{-3}$$

$$P_b \sim 4603{\cdot}9 \mid 6{\cdot}895 \mid 10^{-3} \sim 31{\cdot}74 \text{ MPa}$$

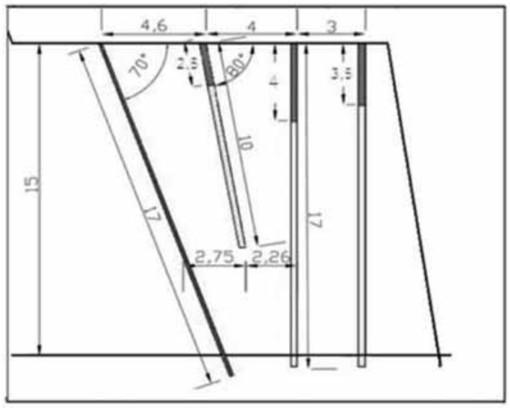
Equation (2) was used for calculation of presplit geometry

$$S \sim \frac{d_h \left((P_b)_{dc} + T \right)}{12T} \qquad (2)$$

where S is the spacing between presplit holes, T is the rock tensile strength, d_h is the hole diameter and $(P_b)_{dc}$ is the decoupled borehole pressure.

Rock mechanics tests

For pre-splitting studies with the objective of back-break control, rock mechanical properties tests were performed.



2 Blast patterns for test no. 1 (red: pre-splitting hole, yel- low: ANFO, beige: stemming): distances are in metre and angles in degree

Rock samples were collected and tested in the rock mechanic laboratory of the mine. Mechanical characteristics of rocks have been calculated as the mean value of 7-8 samples for each rock type (Table 2). Major joint sets characteristics are summarized in Table 2b.

Design of experiments

Test no. 1

In this experiment, drilling and blasting operations were performed in two phases. First the pre-splitting row was drilled, charged, and blasted and then production and buffer holes were drilled, charged, and blasted. The specifications of this test are summarised in Table 3.

Drilling, charging and stemming

Holes in pre-split row were drilled with 1?2 m spacing and with 70u inclination. The hole inclination is

Table 1 Geometric parameters of pit no. 1, Golegohar

Final wall slopes in ore and waste/u	45
Slopes in overburden/u	38
Safety bench height/m	30
Safety bench width/m	10
Safety bench slope/u	65
Working bench height/m	15
Status of slope stability	Induced collapses due to fault and joint systems

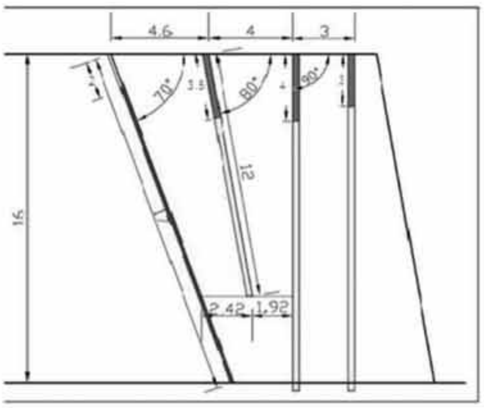
Table 2 Mechanical and physical properties: (a) intact rock; (b) discontinuities

Petrology: (a) intact rocks

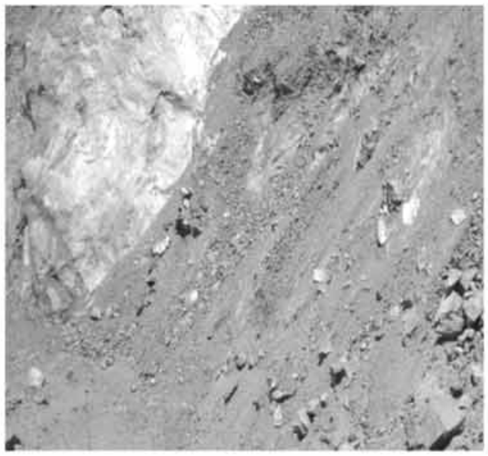
Item		Amphibolite Schist	Quartz Schist	Chlorite Schist	Hematite	Magnetite
Density/t m^{23}	Mean	2·81	2·69	2·84	4·02	4·41
	Range	2·76–3·02	2·63–2·84	2·76–2·95	3·65–4·35	4·15–4·62
Young's modulus/GPa	Mean	34·8	52·7	37·6	29·7	42·6
	Range	19·6–47·1	18·6–77·3	15·7–40·3	14·9–41·2	33–55·9
Uniaxial compression strength/MPa	Mean	42·8	112·5	105·9	66·8	121·4
	Range	18·6–77·3	35·2–176·2	33·7–155·1	30·8–114·8	35·2–176·2
Tensile strength/MPa	Mean	15·4	7·54	13·47	6·95	9·24
	Range	12·1–17·8	6·99–9·42	8·24–18·42	4·63–10·52	5·5–14·62
(b) discontinuities						
Major joints		Spacing/m	Dip/u		Direction	
Set 1		1·1	45		North East– South West	
Set 2		0·8	75		North–South	

3 Test no. 1, crack propagated behind pre-splitting row

5 Pre-splitting blast without back-break behind pre-splitting row, test no. 2.



4 Blast pattern for test no. 2 (red: pre-splitting hole, yellow: ANFO, beige: stemming, white: no stemming/charging): distances are in metre and angles in degree



6 View of final wall after blasting

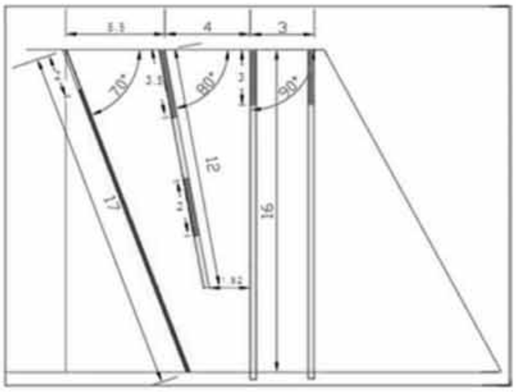
restricted by the mine's final walls slope as indicated in Table 1. The specified inclination for the last row has been identified through numerous blast practices in this mine. The spacing in the pre-split line has been decided primarily based on the results of similar mines in the area. The production holes were drilled vertically in a 3б4 m pattern. A line of buffer holes were drilled with 4 m spacing and 80u inclination with respect to the horizon. Pre-splitting holes were charged fully through plastic tubes with a diameter of 40 mm. Holes were fully charged with no stemming. Stemming length for production holes was 3?5–4 m and for buffer holes 2?5 m. The main charge was ANFO and hole diameter was 165 mm (Fig. 2).

Results of test no. 1

Test no. 1 resulted in formation of a crack 2?5 m behind the pre-splitting row (Fig. 3). Since, pre-splitting is applied to form a separation surface only, but not rock fragmentation, it can be concluded that the blast power was too high. However, back-break might be due to the cratering and gas loading from the buffer hole and not the pre-split. The hypothesis of the excessive power of blasting has been tested here. In the calculated hole pressure the effects of faults, joint systems and other conditions such as the status of the boundary between ore and waste rock were not considered. By taking into account such conditions, the required blast power is reduced (Worsey, 1984).

Table 3 Specifications of test no. 1

Test location	Southern wall of mine No.1, working bench 11, blasting pattern no. 168
Materials	Iron ore and waste rocks
Spacing of joints and cracks	Minimum 0·1 and maximum 1·5 m
Location of nearby faults	8 m behind the pre-split row
Status of underground water	Average water height of 4 measured holes was less than 0·4 mr and the overall pattern can be considered as dry



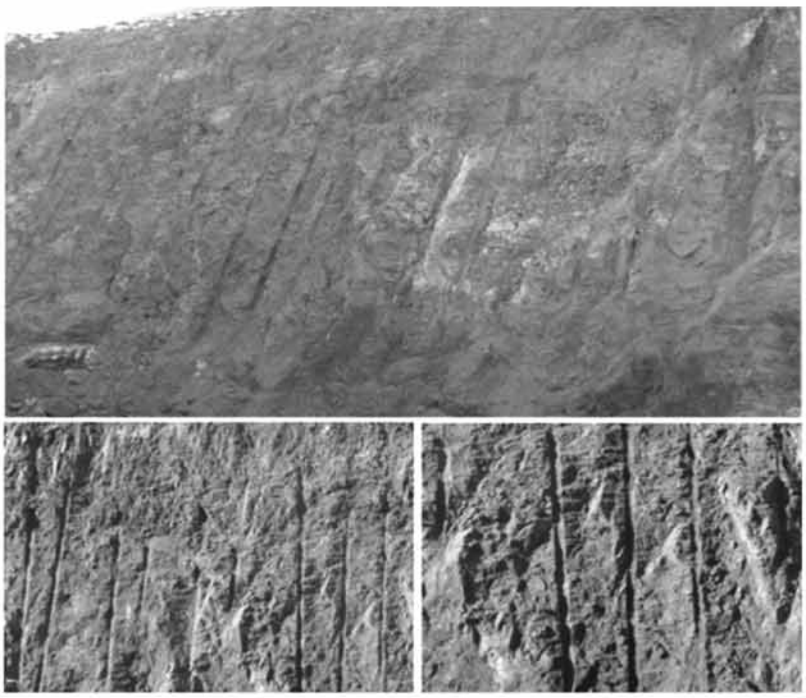
7 Blast pattern for test no. 3 (red: pre-splitting hole, yellow: ANFO, brown: stemming/crushed rock, white: no stemming/charging): distances are in metre and angles in degree

Test no. 2

To reduce the blasting power of the explosives used in a pre-splitting row, there are several alternatives. First, a reduction of the charge diameter, which was not applicable in this case, because the critical diameter of the blast powder is around 40 mm; second, 'air decking' (discrete charging through leaving empty intervals). This method is not applicable due to limitations in accessing required equipment as well as lack of previous experience with this method in the mine. Addition of salt to ANFO in specific ratio was proposed, which is a fast, easy, and considerably cost effective simple alternative. By reducing the strength of explosive in the last row, a considerable decrease in back break phenomenon can be achieved. Salt and sawdust are type of materials which can reduce the strength of Ammonium Nitrate Fuel Oil (ANFO). Some of the main advantages of using salt are: a remarkable reduction in back break, improvement of fragmentation and a reduction of explosive mass.[12]

Drilling, charging and stemming

In this test, salt and ANFO with a ratio of 0?3–0?7, i.e. 30 mass-% salt and 70 mass-% of ANFO were mixed. Three metres of the very bottom of pre-split holes were



8 Final walls showing traces of holes of pre-splitting row after blasting

Table 4 Specifications of test no. 2

Test location	Northern wall. Working bench 11, blast pattern no. 178
Materials to be fractured	Iron ore and waste rocks
Spacing of joints and cracks	Minimum 0·2 and maximum 1·5 m
Location of nearby faults	A diagonal fault behind the pre-splitting row with a distance of at least 4 m in west of the pattern
Status of water	Dry

Table 5 Pre-splitting design of test no. 3

Hole diameter/mm	165
Hole length/m	17
Spacing/m	1·5
Hole inclination	Inclined (70u)
Explosives	ANFO
Mass of charge in each hole/kg	17·5
Salt in each hole/kg	6
Linear charge/kg m^{21}	1·64
Delay	Without delay
Sub-drilling/m	0·5–1
Buffer row's charge	2 m crushed rock (between the main charge)

charged with pure ANFO and the remaining length of the holes with a mixture of 6 kg salt and 14?5 kg ANFO. This mixed charge with salt was applied only to the 12 holes which were closer to the fault. Furthermore, the upper first two metres of all pre-split holes were left empty (no charging or stemming was applied). Pattern specifications of this test are shown in Table 4.

Production holes were drilled vertically and in a blasting pattern of 3б4 m, while the buffer holes were drilled with 80 degrees inclination and in a 4 m spacing (the same as test no. 1). Both production and buffer holes were charged with ANFO. These holes and their specifications are illustrated in Fig. 4.

Results of test no. 2

In this case, back-brake is restricted to a smaller region (Fig. 5) but the final wall still suffers from excessive ore fragmentation (Fig. 6). To improve these areas, a third experiment was designed.

Test no. 3

Drilling, charging and stemming

Drilling and charging parameters of test no. 3 have been specified based on the results of previous tests of this study. Geometry of blasting patterns for pre-splitting, production, and buffer holes are 5?5б1?5, 3 and 4 m (spacing) respectively (Fig. 7).

In this test, the buffer holes were charged discretely in a way that the very bottom 3?5 m of the holes were charged continuously, then 2 m of the hole was filled with crushed rocks, and then the explosives were charged (Table 5).

Inspection and evaluation of test no. 3

In the third experiment, charging method of buffer holes was modified (discrete charging). Also, spacing of pre-splitting holes increased to 1?5 m, as well as the distance from the last row of buffer holes, which was increased to 5?5 m. All other effective parameters were kept fixed. In this experiment, no back-break was observed (Fig. 8) and the shape and stability of final wall surface and slope were very satisfactory.

Conclusion

The main objective of pre-splitting blasting is to produce an artificial surface of separation between the blasted rock mass and the remaining rock mass on the final wall, which will lead to a smooth remaining wall without any/ minimum back-break. In this study, three experiments were performed. Results of the first test were not satisfactory as the full length charging of the holes resulted in severe back-break.

In test no. 2, by mixing salt with the main charge (in a specific ratio) as well as leaving the top part of pre-splitting holes without charging or stemming, back-break was controlled, locally. In test no. 3, by increasing the spacing of the pre-splitting holes and partitioning the main charge in the buffer holes (power reduction), the perfect result was achieved (Fig. 8). In conclusion, in this case study we were able to obtain desired results from pre-splitting, experimentally and in a very cost effective way by:

(i) adding salt, in a mass ratio of 0?3–0?7, to the main charge of the pre-splitting blast holes leaving these holes without stemming

(ii) changing buffer holes charging method (discrete charging).

References

Adamson, W. R. 2013. Reflections on the functionality of pre-split blasting for wall control in surface mining Rock Fragmentation by Blasting, FRAGBLAST 10, Proc. 10th Int. Symp. on 'Rock fragmentation by blasting', 697–705, New Delhi, India.

Calder, P. N. and Tuomi, J. N.1980. Control blasting at sherman mine, Proc. 6th Annual Conf. on 'Explosives and blasting technique', 312–330, Montville, OH, Society of Explosives Engineers.

Chiappetta R. F. 2001. The importance of pre-splitting and field controls to maintain stable high walls, eliminate coal damage and over break, Proc. 10th High-tech Seminar on 'State of the art, blasting technology, instrumentation and explosives application', GI-48. 22–26, Nashville, TN.

Dai, J. 2005. Study on parameters of directional-split blasting based on protecting effectively remaining rock, *Liaoning Gongcheng Jishu Daxue Xuebao (Ziran Kexue Ban)/J. Liaoning Technical Univ. Natural Sci. Ed.)*, 24, (3), 369–371.

Enayatollahi, I. and Aghajani-Bazzazi, A. 2010. Evaluation of salt-ANFO mixtures in back break reduction by data envelopment analysis, rock fragmentation by blasting, Proc. 9th Int. Symp. on 'Rock fragmentation by blasting', FRAGBLAST 9, 127–133, Granada, Spain.

Karimi Nasab, S., Hojat, A., Kamkar-Rouhani, A., Akbari Javar, H. and Maknooni, S. 2011. Successful use of geoelectrical surveys in area 3 of the Gol-e-Gohar Iron Ore Mine, Iran, *Mine Water Environ.*, 30, (3), 208–215.

Monjezi, M., Rezaei, M., Yazdian Varjani, A. 2009. Prediction of rock fragmentation due to blasting in Gol-E-Gohar iron mine using fuzzy logic, *Int. J. Rock Mech. Min. Sci.*, 46, (8), 1273–1280.

Moxham, R. L. and McKee, A. D. 1990. Geology and ore characteristics of the Gol-e-Gohar iron deposit, Seminar, Tehran University, Iran.

Ozer, U., Karadogan, A., Kahriman, A. and Aksoy, M. 2013. Bench blasting design based on site-specific attenuation formula in a quarry, *Arabian J. Geosci.*, 6, (3), 711–721.

Singh, P. K., Roy, M. P. and Paswan, R. K. 2014. Controlled blasting for long term stability of pit-walls, *Int. J. Rock Mech. Min. Sci.*, 70, 388–399.

Workman, J. L. and Calder, P. N. 1994. Predicting and controlling excessive flyrock, *Coal*, 99, (9), 26.

Worsey, P. N. 1984. Effect of discontinuity orientation on the success of pre-split blasting, Proc. Tenth Annual Conf. on 'Explosives and blasting technique', 197–217, Orlando, FL, Society of Explosives Engineers.

Xu, M.-B. and Peng, D.-H. 2008. Parameter optimization of the slope pre-splitting blasting, *Baozha Yu Chongji/Explos. Shock Waves*, 28, (4), 355–359.

SUSTAINABLE MINING IN INDIA

Kishan Gangadhari
Sr.Geologist
M/s NCL Industries Limited

The mining industry in India is an important contributor to the country's GDP and foreign trade and also a significant source of employment generation. The industry is distributed almost all across the country and has operations in some of the remotest areas, where it has also serves as a sole source of infrastructure development.

Geological evidence suggests that India is richly endowed with mineral resources. Explanations have established over 20,000 known mineral deposits.

- India produces 89 mineral, out of which four are fuels, 11 metallic, 52 non-metallic, 3 atomic and 23minor minerals. The mining leases occupy about 0.7% million hectares, which is 0.21% of the total land mass of the country.
- The Indian economy depends to a great extent on the value of the minerals produced, as these represent a major portion of raw materials for the nation's industrial activities. India is the third largest producer of coal in the world and one of the world's leading producers of bauxite, iron ore and zinc ore.
- India's major mineral reserves lie under its richest forests and in the watersheds of its key rivers- these lands are also the homes of india's poorest people, its tribals.
- The three tribal dominated states of Jharkhand, odisha and chattisgarh are the most productive mineral bearing states and account for about 70% of india's coal reserves, 80% of its high grade iron ore, 60% of its bauxite and almost all its chromite reservoir
- Forest cover in these states is far higher than the natural average of the top 50 mineral-producing districts in the country, almost half are tribal where average forest cover is 28% much more than the natural average of about 21%.
- An estimated 1.66 lakh ha of forest land has been diverted for mining in the country. A large part of the country's mineral bearing areas are in the grip of naxalism. 40% of the mineral – rich districts in the top six minerals producing states are affected by the naxal movement which is opposing the lopsided development that mining bring in.

Unplanned Mining Environment:

- Indiscriminate and unplanned mining causes irreversible damage and deterioration of natural resources. Mining activates affect surrounding i.e. air, water, soil, land, biological diversity etc. apart from the society. The environmental, social and economic impacts of mining activities may have short-term as well as long –term implications.
- Guidelines for taking necessary precautions before, during and after mining operations are laid down to ensure sustainable development. The role mining in sustainable development in one issue that decision makers and resource managers have wrestled for decades. Mining is one of those activities that really connect issues relating to people, development, and the environment.
- The negative impact of mining on health, land, water, air, plants and animals and other aspects of society can be reduced by careful planning and implementation of

mining activities. It is essential to strike a balance between mineral developments on the one hand and the restoration of the environment on the other.

Friendly Globalization and Public Relations:

- Increasing globalization of the mining industry has led to changing public attitudes regarding the costs and benefits of mineral extraction and an increase in public pressure to minimize the environmental and social cost associated with mineral development. When the environmental impacts of mining operations are not properly managed and mitigated, it is often too costly to restore mined lands to beneficial use once mineral deposits have been exhausted, leading to a net reduction in available land. It is therefore essential that the Indian minerals industry follows the principles of sustainable development by using methods and practices that minimize the release of contaminants to water, air and soil, preserve and restore lands for future use, and manage displaced populations.

Systematic Development in Mines:

- Mining is a vital segment of the Indian economy. Appropriate systems have been put in place to ensure sustainable growth of sectors, which include formulation of procedures for scientific prospecting and mining and development of a mechanism of prior environmental and forest clearances for mining projects.
- Our endeavor is to protect the health and safety of mine workers and the surroundings, as well as to safe guard the interests of indigenous people through rehabilitation and resettlement packages.
- Efforts are also under way to main stream the artisanal and small scale mining sector in order to promote equity in the mining industry.
- The issues of closure and reclamation of the abandoned mine sites and the exhausting ones are being taken to top priority by various policy instruments. Sustainable Development Framework (SDF) as formulated under the National Mineral Policy 2008 is in place to promote sustainable mining.

TYPES OF EARTHING USE IN MINES

G. Santhosh, Engineer (Electrical),
M/s. NCL Industries Ltd.

The electrical installation an earthing system or grounding system connects specific parts of that installation with the Earth's conductive surface for safety and functional purposes. The point of reference is the Earth's conductive surface. The choice of earthing system can affect the safety and electromagnetic compatibility of the installation. Regulations for earthing systems vary considerably among countries, though many follow the recommendations of the International Electrotechnical Commission. Regulations may identify special cases for earthing in mines, in patient care areas, or in hazardous areas of industrial plants.
In addition to electric power systems, other systems may require grounding for safety or function. Tall structures may have lightning rods as part of a system to protect them from lightning strikes. Telegraph lines may use the Earth as one conductor of a circuit, saving the cost of installation of a return wire over a long circuit. Radio antennas may require particular grounding for operation, as well as to control static electricity and provide lightning protection.

Electrical Earthings

- **Protective Earthing**

1) An earth ground connection of the exposed conductive parts of electrical equipment helps protect from electric shock by keeping the exposed conductive surface of connected devices close to earth potential, when a failure of electrical insulation occurs. When a fault occurs, current flows from the power system to earth. The current may be high enough to operate the over current protection fuse or circuit breaker, which will then interrupt the circuit. To ensure the voltage on exposed surfaces is not too high, the impedance (resistance) of the connection to earth must be kept low relative to the normal circuit impedance.
2) An alternative to protective earthing of exposed surfaces is a design with "double insulation" or other precautions, such that a single failure or highly probable combination of failures cannot result in contact between live circuits and the surface. For example, a hand-held power tool might have an extra system of electrical insulation between internal components and the case of the tool, so that even if the insulation for the motor or switch fails, the tool case is not energized.

- **Functional Earthing**

3) A functional earth connection serves a purpose other than electrical safety, and may carry current as part of normal operation. For example, in a single-wire earth return power distribution system, the earth forms one conductor of the circuit and carries all the load current. Other examples of devices that use functional earth connections include surge suppressors and electromagnetic interference filters.

High-Voltage Systems

In high-voltage networks (above 1 kV), which are far less accessible to the general public, the focus of earthing system design is less on safety and more on reliability of supply, reliability of protection, and impact on the equipment in presence of a short circuit. Only the magnitude of phase-to-ground short circuits, which are the most common, is significantly affected with the choice of earthing system, as the current path is mostly closed through the

earth. Three-phase HV/MV power transformers, located in distribution substations, are the most common source of supply for distribution networks, and type of grounding of their neutral determines the earthing system.
There are five types of neutral earthing:

1. Solid-earthed neutral
2. Resistance-earthed neutral
3. Low-resistance earthing
4. High-resistance earthing
5. Unearthed neutral

Solid-Earthed Neutral:

In solid or directly earthed neutral, transformer's star point is directly connected to the ground. In this solution, a low-impedance path is provided for the ground fault current to close and, as result, their magnitudes are comparable with three-phase fault currents. Since the neutral remains at the potential close to the ground, voltages in unaffected phases remain at levels similar to the pre-fault ones; for that reason,this system is regularly used in high-voltage transmission networks, where insulation costs are high.

Resistance-Earthed Neutral:

To limit short circuit earth fault additional neutral grounding resistance (NGR) is added between neutral, transformer's star point and the ground.

Low-Resistance Earthing:

With low resistance fault current limit is relatively high. In India it is restricted for 50 A for open cast mines as per Central Electricity Authority Regulations, CEAR, 2010, rule 100.

High-Resistance Earthing:

High resistance grounding system grounds the neutral through a resistance which limits the ground fault current to a value equal to or slightly greater than the capacitive charging current of that system.

Unearthed Neutral

In unearthed, isolated or floating neutral system, as in the IT system, there is no direct connection of the star point (or any other point in the network) and the ground. As a result, ground fault currents have no path to be closed and thus have negligible magnitudes. However, in practice, the fault current will not be equal to zero: conductors in the circuit particularly underground cables have an inherent capacitance towards the earth, which provides a path of relatively high impedance.
Systems with isolated neutral may continue operation and provide uninterrupted supply even in presence of a ground fault. However, while the fault is present, the potential of other two phases relative to the ground reaches of the normal operating voltage, creating additional stress for the insulation; insulation failures may inflict additional ground faults in the system, now with much higher currents.
Presence of uninterrupted ground fault may pose a significant safety risk: if the current exceeds 4 A – 5 A an electric arc develops, which may be sustained even after the fault is

cleared. For that reason, they are chiefly limited to underground and submarine networks, and industrial applications, where the reliability need is high and probability of human contact relatively low. In urban distribution networks with multiple underground feeders, the capacitive current may reach several tens of amperes, posing significant risk for the equipment.

The benefit of low fault current and continued system operation thereafter is offset by inherent drawback that the fault location is hard to detect.

One of the large uranium mine (Underground) used earthing syatem

Resistance-Earthed Neutral (India)

A resistance earth system is used for mining in India as per Central Electricity Authority Regulations. Instead of a solid connection of neutral to earth, a neutral grounding resistor (NGR) is used to limit the current to ground to less than a750 mA. Due to the fault current restriction it is more safe for gassy mines. Since the earth leakage is restricted, leakage protection devices can be set to less than 750 mA . By comparison, in a solidly earthed system, earth fault current can be as much as the available short-circuit current.

The neutral earthing resistor is monitored to detect an interrupted ground connection and to shut off power if a fault is detected.

Used Regulations:

In India as per Central Electricity Authority Regulations, CEAR, 2010, rule 41, there is provision of earthing, neutral wire of a 3-phase, 4-wire system and the additional third wire of a 2- phase, 3-wire system. Earthing is to be done with two separate connections. Grounding system also to have minimum two or more earth pits (electrode) such that proper grounding takes place. As per the rule 42, installation with load above 5 kW exceeding 250 V shall have suitable Earth leakage protective device to isolate the load in case of earth fault or leakage.

7 COMMON HEALTH RISKS IN THE MINING INDUSTRY

MR. M. RAVI KIRAN, DY. MANAGER
NCL INDUSTRIES LTD.

The mining industry has a reputation for being a risky business, with health risks that are varied and often quite serious, and it is important for miners to protect themselves accordingly.

Nevertheless, mining doesn't have to be unsafe. With the introduction of strict safety legislation and protocol, as well as advances in safety equipment, the industry has seen its fatality rate drop over time. Although the goal of zero harm has not yet been achieved, it remains the standard that mining companies continue to strive towards.

"Understanding and being aware of your environment is the first step to preventing illness or injury in the workplace," reveals mining medicine researcher Megan Clark, who outlines the following 7 common health risks to watch out for in the mining industry.

1. Dust

Dust inhalation is one of the most common concerns for miners. "The ongoing inhalation of dust can cause occupational lung disease group Silicosis. It varies in severity, but symptoms include shortness of breath and scarring of lung tissue, which can cause ongoing respiratory issues".

Mining companies need to develop a dust control plan, and supervisors should ensure that dust control systems are working properly for every production shift. Mine workers should be trained on the hazards of over-exposure to mine dust. Respiratory protection should be used when dust control protection is being installed, maintained or repaired. Medical screening and surveillance is also essential.

2. Noise

Mines are noisy places, with the constant of drilling and heavy machinery, and the potential for hearing damage is quite serious. "It can be easy for you to mentally get used to loud noises, but that doesn't mean that damage isn't still being done. Many people don't notice the damage to their hearing until long after they were first exposed to the noisy environment, as most damage occurs very slowly. Over-exposure to excessive noise can result in tinnitus (ringing in the ears), sleep disturbances, concentration problems and even permanent hearing loss".

To protect workers against noise, mining companies should evaluate working conditions and noise exposure through risk assessments. Avoiding and reducing exposure can be achieved by appling engineering controls at the noise source or along the noise path to reduce exposures, such as vibration dampeners or absorptive panels. Regular maintenance of machines is also essential to reducing noise. Employer must ensure proper use of personal hearing protection amongst noise-exposed employees, while providing necessary health and safety training and maintaining up-to-date health surveillance records.

3. Whole body vibration

Whole body vibration (WBV) is a slow forming physical hazard that occurs in mining workers and other occupations that work with heavy machinery. "In the mining environment, WBV can be caused either by spending a lot of time sitting on machinery, which is most of the time in mining extraction, or by standing, such as working on jumbo operators. Some forms of vibration are ok, but they become dangerous when they involve uneven surfaces, vehicle activity such as ripping versus pushing material in a bulldozer, and engine vibrations. Symptoms of WBV include musculoskeletal disorders, reproductive damage in females, vision impairment, digestive problems and cardiovascular changes". Again, reducing exposure also reduces the health risks and should be the first step that mining companies take. This might include filling in potholes on unmade roads, minimising the transport of goods or materials, or replacing manned with unmanned machines such as remotely controlled conveyors. Where risks cannot be avoided, supervisors should reduce the time for which the employee uses the machine each day. Instruction and training are critical, and symptoms of back pain in employees should be closely monitored.

4. UV Exposure

For open-pit miners, understanding the risk of over-exposure to UV (ultraviolet) radiation in sunlight is essential. "Over exposure of ultraviolet rays can put you at risk of skin cancer, of which Australia has the highest rate in the world. Not only can UV rays cause melanomas to form, but they can cause serious damage to your eyes if you are not wearing protective eye wear. In the short-term, overexposure to the sun can cause dehydration, headaches and nausea. Mine workers often spend whole days out in the baking hot sun, so are naturally at a very high risk of developing cancer and eye problems if they are not adequately protected".

Employers should conduct a risk assessment on outdoor work scheduled to assist in developing appropriate sun protection measures. The most effective way of reducing UV exposure is to use a combination of protection methods, including re-organising work to avoid the UV peak of the day, providing natural or artificial shade, providing appropriate protective clothing, and applying sunscreen. It is also important that employers train employees to raise awareness of the risks associated with exposure to UV and the sun protection measures required. Employers can provide skin cancer checks as part of regular workplace medical examinations and in pre-employment medical checks.

5. Musculoskeletal disorders

Musculoskeletal disorders (MSDs) refer to any problems affecting your bones, muscles, blood vessels and nerves. "Mine workers are exposed to a variety of potential health risks that fall under this broad category. While musculoskeletal damage can occur due to a trip, fall or heavy lift, the more serious ones occur slowly over time. This could be due to ongoing heavy lifting or repetitive strains".

Preventing MSDs needs to be a key part of every workplace health and safety program. In safe and healthy workplaces, employers should identify and assess job-related MSD hazards and put in place controls to reduce workers' exposure to MSD hazards. Furthermore, workers should be advised and trained about MSD hazards in their job and workplace and should be encouraged to participate in health and safety programs through early reporting of MSD symptoms or concerns to their supervisors. Employers should follow up to ensure preventative measures are working.

6. Thermal stress

A common health risk that miners face is thermal – or heat – stress. “Mining environments are often very hot and humid, particularly those in outback Australia, which over time can cause thermal stress in workers. Overexposure to heat and humidity can cause the body to become fatigued and distressed. This can result in heat stroke or more serious ongoing health problems”.

Where there is a possibility of heat stress occurring, companies need to carry out a risk assessment that considers the work rate, working climate and worker clothing and respiratory protective equipment. Where possible, control the temperature using engineering solutions, provide mechanical aids where possible to reduce the work rate, and regulate the length of exposure to hot environments. Furthermore, personal protective equipment should be provided, such as specialised protective clothing that incorporates personal cooling systems or breathable fabrics. Furthermore, companies should provide training for workers, especially new and young employees, and monitor the health of workers at risk.

7. Chemical hazards

Mine workers are often exposed to harmful chemicals. “As an example, the most common group of chemicals that cause concern in the mining environment are polymeric chemicals. Regardless of the chemicals you work in close proximity to, appropriate safety wear and precautions need to be taken to minimise your body’s exposure to them. Risks include chemical burns, respiratory problems and poisoning”.

Each chemical has a unique set of hazards and needs to be handled properly to ensure worker safety, so employers need to conduct risk assessments to establish best practices. A standard operating procedure (SOP) that addresses the use of correct personal protective equipment, safe handling, safe use, and proper disposal should be established. Ventilation is also an important factor in minimizing exposure, as well as general housekeeping and cleanliness. Thorough training and drills should be conducted regarding the company’s spill response plans and chemical hygiene plans.

IMPORTANCE OF DRILLING IN MINES FOR A GOOD BLAST

Name : B.Abdul Gouse
Designation : Jr.Manager (Mines Survey)
Organization : RINL/ VSP.

Drilling is the first activity in a chain that ends in the production of concentrate. Many operations treat drilling as a necessity in the production process, but fail to provide the necessary investment in training, management of the activity, or evaluation of the quality. Usually, poor blast result judgments are immediately directed at the explosives or initiation system without ever considering the effect of drilling quality.

Factors that could have a huge bearing on the eventual blasting results include collaring, deflection accuracy, short-drilling, over-drilling, or the incorrect hole diameter on blast results.

The notion that you can effectively blast a volume of rock without drilling any holes is absurd. So it should be equally absurd that you would expect a 100% blast result with only 80% of the holes being drilled correctly. This is not as obvious to most people as is stated here. For example, I have often dealt with the following type of requests:

- We have already drilled the blast. Please do a timing design for this blast that will ensure good fragmentation and low vibration.
- We have drilled the blast and a number of holes have been lost due to collapses. We are hoping your electronic detonators will help us get around this problem and ensure that we don't end up with poor fragmentation.
- We are getting high bottoms on our blasts, and drilling is definitely not the problem. It is: (a) your explosives; (b) your initiation system; (c) both; or (d) your blast design.

Distances between holes:-

The drill pattern is a critical part of blast design and is related to hole diameter, explosives energy, bench geometry, and rock properties. Drilling that does not adhere to the design has negative consequences to the blast result.

Where holes are drilled too close together, the following problems occur:

- Rock fragmentation tends to be over-fine. This may not suit the sales requirement of the product and therefore results in lost revenue. A loss in profit also occurs because of the higher drill and blast cost associated with holes that are drilled closer together than the design calls for.

- Explosives in nearby unfired holes may become damaged and detonate improperly, or it may detonate sympathetically. In either case, poor fragmentation results can be expected, especially in the toe region of a blast.
- A hole drilled too close to the next hole is uncommon. More prevalent though is holes being drilled too far apart or overlooking holes. Where holes are drilled too far apart, the following problems occur:
- The explosive energy will be below design levels. Coarser fragmentation and high floors will result. This can slow down loading rates and increase both loading and crushing costs dramatically.
- Harder rock is less tolerant of holes being drilled too far apart, so fragmentation will be severely affected.

***Collaring*:-**

Collaring errors can be attributed to the drill operator drilling in the wrong place. This can be caused by:

- Poor marking out of hole positions;
- Markers being moved with traffic on the blast or the trailing cables of a drill;
- Poor attention from drill operator; and
- Failure of drill GPS-based positioning systems.

Angle errors:-

Two types of angle errors can occur:

- The hole deflects offline. This is more common in smaller diameter holes that are drilled using top-hammer drills. It is caused by too much pull down force, or by dipping rock strata of variable strength. Hole deflection can be limited, but requires an experienced driller.
- The drill rig is set-up with the boom at a different angle to the desired hole angle. This control problem can be worsened by inadequate or un calibrated level checking devices on the drill rig.

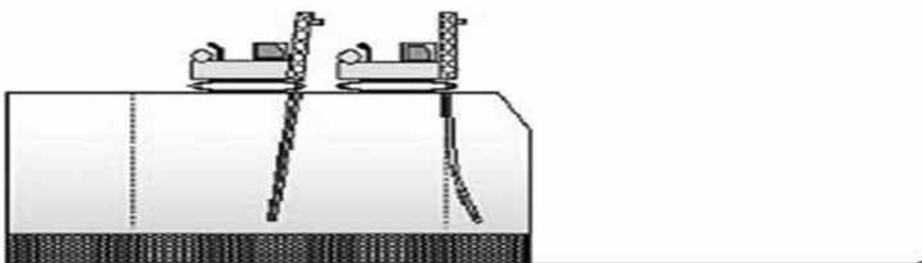


Figure 1: The two types of angle errors that can occur. Well-trained drill operators can minimise this type of error, although hole deflection errors are more difficult to eliminate.

Figure 1: The two types of angle errors that can occur. Well-trained drill operators can minimise this type of error, although hole deflection errors are more difficult to eliminate.

Figure 2: Example of two hole collars in the same block of a hard rock blast.

Hole depth:-

Short holes or holes that are too deep are both undesirable. Short holes will always result in high floors or capping being left behind. The explosion pressure at the bottom of a blast hole is much lower than it is at the sides of a hole. Unless the rock is very soft and layered, you cannot expect a hole to fragment downwards.

Holes that are drilled deeper than their design depth cause damage to the rock below. If the rock is soft, such as coal, the coal will be pulverized and will most probably be removed by the dragline.

Coal losses are a problem with over drilling. Damage to the rock below causes drilling problems in that layer. The most common drilling problems are collar blockages and lost holes caused by loose material falling into the hole.

Hole positioning:-

The incorrect positioning of holes in a blast has a similar effect on hole quality as does over-drilled holes from the previous bench. For safety purposes, holes on succeeding benches are normally laid out so they can be positioned between the sockets of the preceding holes. The aim is to avoid drilling into potential misfires.

Often holes end up being drilled into badly damaged rock from previous sub-drill damage. This results in collars that collapse very easily and thus present a high risk of hole blockage due to material falling into the holes.

Figure 2 shows examples of holes drilled into sub-drill damaged rock and holes drilled into competent undamaged rock in the same blast. The rock is more damaged close to toes and less damaged between toes of holes in the bench above (Figure 3). Damaged collars lead either to shorter holes or blocked holes that need re-drilling. Another risk is that loose rocks in a damaged collar can harm down lines or primers and lead to unwanted misfires. The risk is increased when charging hoses are lowered down such holes. Very often, sub-drill damage is so high that a re-drill is impossible and the area ends up without a hole. Missing holes have a very deleterious effect on floors and fragmentation in a blast. The hole on the left exhibits serious collar damage and collapse due to the hole having been drilled into previously sub-drill damaged rock. The hole on the right exhibits minimal collar damage and a low risk of hole-loss because the collar rock is less damaged by the preceding blast above. Therefore, when planning hole positions, the drill pattern should be moved around over a layer of hole pick-ups from the previous level until most holes are as close as possible to the centre points of the original grid. This principle is illustrated in **figure 4.**

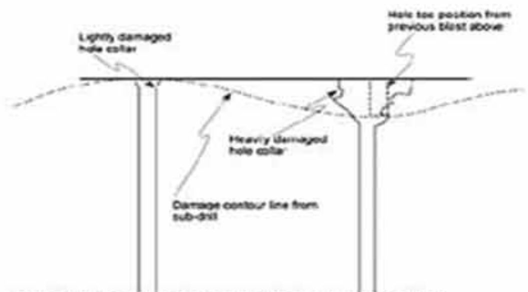


Figure 3: Hole positioning relative to damage contour line caused by sub-drill from previous hole positions in blast above.

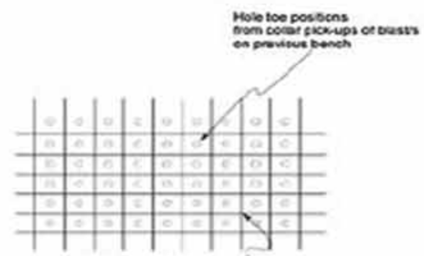


Figure 4: New holes should be positioned so they are located to the hilt between the toes of the previous collar pick-ups.

Figure 3: Hole positioning relative to damage contour line caused by sub-drill from previous hole positions in blast above.

Figure 4: New holes should be positioned so they are located to the hilt between the toes of the previous collar pick-ups.

***<u>Hole diameter and its influence on energy</u>*:-**

A blasthole diameter is usually not the same as the diameter applied in the blast design. This is because of two factors:

- Bit wear in hard rock will result in holes with smaller diameters than expected; and
- Soft rock or partially damaged rock will result in a hole that is slightly bigger than the expected diameter. Drill steel slap (most common on poorly balanced drill steel in rotary drills) will cause the hole diameter to be larger than the design.

- Hole diameters that are smaller than expected lead to explosive energy starvation at the hole bottoms and a risk of over-charging with related fly rock and air blast. Hole diameters that are larger than expected lead to excessive energy, rock damage, and a risk of under-filling. An under-filled blasthole will normally lead to large boulders forming at the top of a blast. The energy impacts are significant on hole diameter variations that are common in the field (Figure 5 and Figure 6). Small variations in diameter have a significant impact on energy in a blast, especially in larger diameter holes.

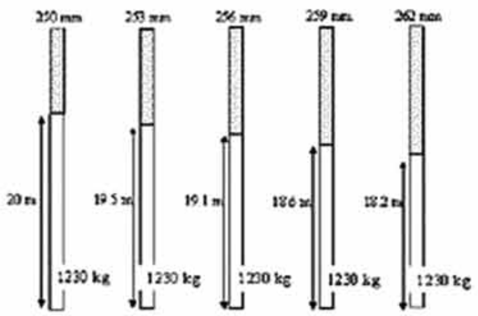


Figure 6: The influence of hole diameter on stemming length when a fixed charge mass per hole is applied.

Figure 7: These bits were spotted in the bit-rack of a drilling rig in a gold mining operation. This is an example of the large range in bit sizes used by one driller on a single blast.

Figure 6: The influence of hole diameter on stemming length when a fixed charge mass per hole is applied.
Figure 7: These bits were spotted in the bit-rack of a drilling rig in a gold mining operation. This is an example of the large range in bit sizes used by one driller on a single blast.

Many operations require a fixed charge mass per hole to control the powder factor. This poses a severe risk, as the powder factor is normally calculated from the drill bit diameter and does not consider what the actual hole diameter ends up being.

Controlling hole diameter:-

I have often encountered the application of the incorrect drill bits in a pattern. This problem occurs most often in operations that have two bit diameters in their blasting, such as a larger bit for production holes and a smaller bit for buffer and pre-split holes. This is not a problem when bit allocation is well controlled by the drilling foreman, but with poor control the small diameter holes that appear in production patterns result in severe degradation of fragmentation.

The problem is equally serious with prolonged bits use, which leads to reduction in diameter. When bit discard is done too late, energy in the blast is compromised and poor fragmentation, heave, and floor conditions will be the result.

The problem is most severe in small diameter holes, such as those drilled in stopes and development ends. The blasthole diameters in these holes are already close to the critical diameter of the explosives being used. A significant drop in diameter in these holes will not only drop the overall energy in the rock, but will also compromise explosives performance.

The importance of drilling:-

Drilling needs to be given a high priority in the production cycle. It should not be treated as a basic operation where operator training is minimal and inexperienced foremen are used. Explosives and blast timing cannot correct poor drilling.

The consequences of such poor drilling will most often be the following:

- Coarser fragmentation;
- Less heave and tighter digging conditions;
- More secondary blasting;
- More wear and tear on loading and crushing equipment;
- Slower throughput and production rates;
- Higher risk of back damage and associated safety/production impacts;
- Higher risk of vibration damage;
- More difficult drilling in following benches;
- Poor pit conditions and general loss of staff pride in their job; and
- Bad blast results. The negative cost and profitability effects as a result of poor drilling are excessive and could even lead to the closure of an operation.

***

DUST CONTROL PRACTICES IN OPENCAST MINES

P. Kalyan
Managemenet Trainee (Tech)
Jaggayyapeta Limestone Mine, Jaggayyapeta
RINL/VSP
Ph.no:9491473478

ABSTRACT: Mining is a dust prone occupation and almost every major process in mining contributesto the atmospheric load of suspended particulate matter. Prolonged exposure of this dust is known to cause various respiratory diseases including deadly pneumoconiosis among the miners. It has developed a few simple yet effective techniques for controlling dust in drilling, crusher houses, transfer points, and haul roads. These techniques of dust control are gaining industry interest in recent years mainly for two reasons: (a) dust generation has increased significantly due to higher mechanisation and the introduction of mass production technologies to meet our growing production needs making application of dust control mechanism inevitable, (b) growing consciousness of environment and stricter environmental compliance mechanisms has put constant pressure on the mining industry for regular use of dust control practices. The present paper briefly describes the techniques/methodologies for controlling dust during different drilling&blasting practices and at crusher house and conveyor transfer points and haul roads in the mining industry.

INTRODUCTION

Many processes can be pinpointed as contributions to dust generation like drilling, blasting, haul roads, conveyor belts and crusher houses. With an increased level of mechanisation and the pressing demand to boost production for minimising the supply gap, generation of air borne respirable dust is increasing necessitating more effective dust control practices.. Limestone dust may cause discomfort or constipation if swallowed. If large quantities are swallowed, it maycause nausea, hypercalcaemia or hemorrhage.

EFFECTS OF DUST

Inhalation of pulverized limestone or limestone dust may cause irritation of the respiratorysystem resulting in coughing and/or sneezing. Higher exposures may cause a build up of fluid inthe longs with severe shortness of breath.Prolonged or repeated inhalation of respirablecrystalline silica can also cause a lung disorder, silicosis.

Air-borne dust from mining activities spreads over nearby populated areas and crops causing harmful effects in many ways to the people, vegetation, forests, animals and water resources. The corrosive effect of the dust shortens the life of lubricants of Heavy Earth Moving Machinery (HEMM), increases maintenance costs and reduces its operating efficiency. The dust impedes visibility thereby reducing production capacity. It is also a potential safety hazard.

DUST CONTROL IN DRILLING

Drilling produces the largest quantity of respirable dust per unit weight during the shortest time. A studyreports up to **25 kgs** of respirable dust generation per meter of drillingby a **115 mm diameter drill** in limestone opencast mines. Table 1 presents the level of dust generation during drilling in coal, limestone and iron ore which reveals that air borne dust generated in drilling increases with drill diameter and rock hardness. Analyses of dust collected from these drill holes reveals that the bulk of the drill hole dust (up to 65%) was above 500 micron in size, up to 12.2% was under 53 micron and up to 1% was in the respirable range.

Table 1 - Quantity of total dust generated from drill hole for coal, limestone and iron ore for different drill hole diameter

Diameter of drill hole (mm)	Amount of dust (kg) generated per meter of drilling		
	Coal	**Limestone**	Iron ore
60	3.7	**7.8**	12.7
100	10.2	**21.5**	35.5
150	23.0	**48.6**	79.5
200	40.9	**86.4**	144.5
250	63.75	**134.9**	220.7
300	91.92	**194.5**	318.2

Drilling is essential in mining and large quantities of dust will be produced irrespective of the method of drilling. Therefore, various methods of dust suppression will have to be introduced to bring down the concentration of dust to safe limit. The principal dust suppression methods are wet drilling, suppression by fog and dry dust collection.

The wet drilling method is based on the introduction of water into the hole being drilled, through the centre of drill steel. But it has not yet been possible to establish the relationship between the dust collecting capacity and the shape and size of the bit or even the number of outlet holes for thewater. However, water has poor efficiency for collection of respirable dust. Water adds to the risk of jamming of the drill bit inside the drill hole, and reduces the rate of drilling. Addition of small amount of soluble oil (0.1-3%) creates an emulsion which reduces surface tension of the water and may improve the performance and extends the life of the bit. Many studies have shown that the addition of wetting agents to the circulating water is expensive with relatively little effect on fine dust collection.

DUST EXTRACTOR FOR JACK HAMMER DRILLING

The dust extractor is comprised of a hood with a cushion base, an elastic collar attachment to cope with intermittent hammer motion and an elastic collar grip on the drill rod to prevent air leakage to atmosphere. A collared base plate is added to the bottom of the hood above the cushion base. A long filter bag is attached to the funnel opening. A foot pedal ensures firm grip of the device to the ground during drilling. The arrangement of the dust extractor is shown schematically in Figure 1.

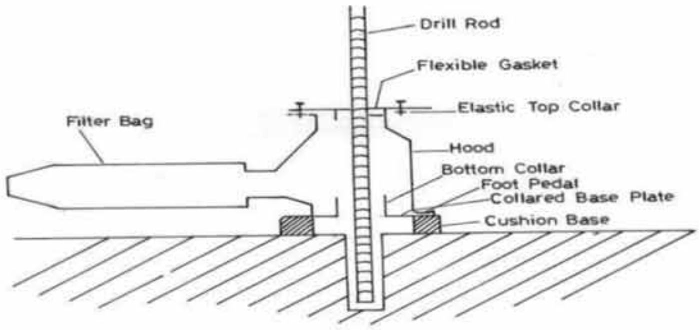


Figure 1 - Dust extractor for jack hammer drill

The jack hammer drill rod passes through the elastic collar, and through the base plate collar. The elastic top collar provides a leak proof grip on the drill rod, and yet it lets the rod move up and down during hammer action. The flexible gasket too permits free hammer motion without leakage. The base collar does not allow dust to fall back to the drill hole. During drilling, the cuttings are transported to the hood by the scavenging compressed air, which eventually gets channelled through the filter bag. The bag lets the air go out and retains all the dust. This gives collection efficiency (Table 2) of about 90%. The dust collection process is dry. No dust is allowed to fall back to the drill hole. For this reason use of the device improves on the rate of drilling. The device is ideal for secondary drilling as well as horizontal drilling in underground mines.

Table 2 – Result of Air borne respirable dust concentration in rock drilling by jack hammer drills of 33 mm diameter with and without dust extractor

Operation	Drilling without extractor in ppcc*	Drilling with extractor in ppcc*	Dust collection efficiency %
Before drilling	200		
During 1st hole drilling	2720	440	83.82%
During 2nd hole drilling	3973	436	89.03%
During 3rd hole drilling	5695	659	88.42%

*particles per cubic centimetre

DUST ARRESTER FOR LARGE DIAMETER DEEP HOLE DRILLING IN OPEN PIT MINES

Up to a few hundred kilograms of broken dust is generated from each drill hole. The dust is finer than what is formed in other mining operations and contains a significant proportion of respirable dust. Normally this dust is flushed out from the drill hole by a few cubic meters of compressed air, at high velocity. This dusty air loses its kinetic energy upon reaching the surface, and a dust cloud is formed around the drill. The energy which is wasted in polluting the environment is put to use in the CIMFR designed Dust Arrester to clean the air of its own dust.

The dust arrester is a rectangular box with a ring shaped foam cushion washer at the top, a collar base plate with a cushioned bottom, and a large opening on one side to which a specially shaped long and tough filter bag is attached. Figure 4 explains the design of the dust arrester schematically. For dust collection, drilling is carried out through this device. The box is placed on its cushion base at the selected site. The drill rod is introduced through the top ring cushion and through the base plate collar till the drill rod touches the ore body. The dust filter bag is fully stretched. The hole in the ring cushion is smaller than that of drill rod, but flexible enough to let the larger drill bit pass through. This ensures an airtight grip between the drill rod, and the ring cushion yet permit free rotation of the rod. During drilling, part of coarse dust gets deposited around the base collar and fines pass through the filter bag. The base cushion gets pressed against coal strata due to the weight of dust settling inside the box, thereby preventing leakage of air at its base.

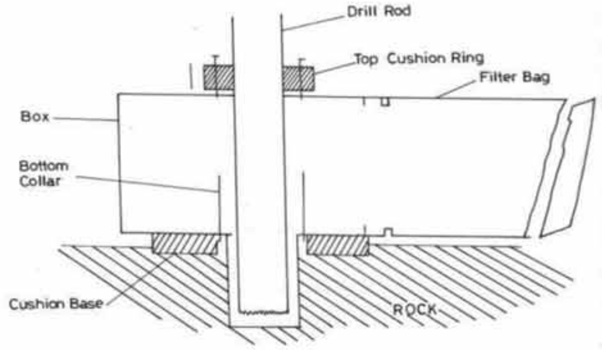


Figure 4 - Dust arrester for large diameter deep hole drilling

Thus, the cushion at the top surrounding the drill rod and the cushion at its base together make the extractor an air tight unit, and therefore, dusty air from drill hole moves on its own towards filter bag for dust collection. The large surface area of the filter bag permits slow filtration of dusty air through its pores. Table 3 present the performance study of the dust arrester in stone and iron ore. The current design is ideally suited for drills of diameter up to 120 mm. A modified version is under consideration for larger diameter drills. The total weight of the box is about 5 to 6 kg only and that of bag another 3 to 4 kg.

Table 3 - Air-borne dust concentration measured during drilling in stone with and without dust arrestor using 150 mm drill master drilling machine

Time measured from start of drilling	Drilling with dust arrestor (ppcc)	Drilling without dust arrestor (ppcc)
1 minute	160	1998
5 minute	177	3000
10 minute	220	4940
15 minute	230	8053
Average	198	4650
Reduction in respirable dust	95.7%	

DUST CONTROL IN HAUL ROADS

Unpaved haul roads in mines are a veritable source of dust pollution supporting normally 10 to 15 mm of dust on its surface. Dust from haul roads gets lifted and floats in the air during movement of trucks and forms a dust cloud. With an increase in the weight of trucks, speed and frequency of traffic, the cloud may appear to be continuous causing delays and difficulties. During continuous dumper runs, dust loads of surrounding atmosphere builds up both vertically and horizontally. Application of water at frequent intervals remained by far the most practical solution for the control of dust on haul roads. It becomes more cumbersome and costly where water is not easily available. Unfortunately water becomes a scare resource in summer when it is required most. A number of techniques have been adopted addressing these issues which includes application of hygroscopic chemicals like calcium/magnesium to increase water retentivity. These chemicals require repeated application as they are re-dissolved in subsequent water sprays and tend to drain out to lower levels in the usually sloppy mines, adding to cost of treatment. Spray with oil-water emulsion also helps to consolidate dust but it does not penetrate deep and underlying dry dust layers gets airborne quickly during dumper movement.

- Wet encrustation using super absorbent chemicals which can absorb, retain and reabsorb water several times, its weight without getting dissolved. The methodology involves mixing of the chemical with road dust and application of the water. It helps in very effective water management by increasing the water retaining capacity of road dust and in the process consolidates the dust and conserves water. This chemical is not known to have any environmental ill effects. Poor chemical absorbed water is not squeezed out under thecompressive force of tyres, the bondage being at molecular level.
- To avoid water wastage and improving the economic viability of water spraying, it has also been proposed to selectively wet the road surface close to the tyre/road surface contact plane, before tyre to surface contact occurs, which can effectively eliminate dust emission from haul roads with far less spray of water. This can be achieved by designing a system to spray an adequate quantity of water ahead of the front tyre in each dumper. The system should be wide enough to match back wheel width and should preferably be fitted with inwardly facing sprays.
- Water requirement decreases by more than 50% and a commensurate reduction in diesel consumption for running of water tanker. Moisture of haul roads are increased three fold in comparison to normal watering.
- Sieve test analysis of haul road dust with chemical and with water alone reveals that application of chemical improves agglomeration conditions as fines (size 0.5 mm or less) have been reduced after application of chemical by 80%.

Young Workers Safety at Mines

K. Srinivasa Rao
Jr. Manager (Geology)
Jaggayyapeta Limestone Mine
Visakhapatnam Steel Plant (RINL)
Jaggayyapeta Mandal, Krishna District - 521175.

1. Introduction:

Mines are striving for the goal of Zero Injuries all the time. This goal is set for all areas of mining activity and for all the workers on the mine.

2. Mining Safety for Younger Workers:

When you're young you think you're invulnerable. Accidents and injuries happen to other people, not you. And that's exactly the kind of thinking that makes young workers so vulnerable to workplace accidents. Young workers were twice as likely to be injured on the job as adult employees.

They are particularly vulnerable to accidents their first few weeks on the job. In fact, new, young, and inexperienced workers are over 5 times as likely to be injured during their first 4 weeks on the job. Young male workers are more likely to be involved in workplace accidents.

3. Reasons for higher Injury risk amongst younger workers:

Reasons young workers are injured include lack of:

- Knowledge
- Skills
- Understanding of risks, safety rules, and procedures
- Good judgment and impulse control
- Safety training
- Fatigue may be another important safety issue with young workers.
- Many young people are tired from trying to balance work, a social life, and sometimes night school as well.
- They often don't get enough sleep, and then they may come to work tired.
- Tired workers are not alert, safe workers.
- Furthermore, you can't rule out the influence of drugs and alcohol especially intoxicants like beer.

4. Information is for:

- an employer of new and/or young workers;
- a young worker;
- starting a new job;
- taking on a new role or task for the same employer;
- changing careers; or
- re-entering the workforce after a break.

New and young workers could be working permanently or casually, full or part time. They could be contractors, apprentices, trainees or those taking part in work experience or a structured workplace learning program.

a) Who can new and young workers speak to for more information or help?

- Speak to your immediate supervisor, employer and/or health and safety representative if your workplace has one.
- Health and safety representatives are there to represent workers on health and safety issues to your employer or management representative.

- If your workplace doesn't have a health and safety representative, you can ask your employer to set up a process so one can be elected.
- You could also speak to one of your more experienced workmates.

b) What are the employers' responsibilities for workplace health and safety?

To provide a safe and healthy workplace:
As an employer, as far as practicable, ensure the work environment and the way workers carry out their work is safe and healthy, regardless of the type and terms of their employment. This includes preventing them from both physical hazards (for example, slippery floors, heavy loads, faulty and unguarded machinery and equipment and chemicals) and 'psychosocial' workplace hazards (for example, bullying, violence and fatigue). Consider the tasks give to new and young workers, given their skills, abilities and experience.

To provide training and supervision:
As an employer, make sure workers have enough information, training and supervision to enable them to work safely. This training must:

- ✓ show workers how to do their job safely and how to recognise hazards on the job;
- ✓ provide and show workers how to safely use the necessary machinery and equipment; and
- ✓ provide and show workers how to safely wear and use any personal protective clothing and equipment (PPE), such as gloves, safety footwear and goggles.

Should also:

- ✓ show workers how to report any safety concerns or hazards;
- ✓ help them to get to know the workplace layout, their immediate supervisor, safety and health representative (if there is one) and co-workers; and
- ✓ make it easy for new and young workers to ask questions – don't assume they will ask.

To talk to workers about safety and health:
As an employer, responsible for sharing information with workers about workplace safety and health matters, including:

- ✓ asking for their input when looking at any workplace hazards and ways to control them;
- ✓ discussing new machinery and equipment when it is introduced into their work area;
- ✓ holding discussions at team or toolbox meetings where safety and health concerns can be raised; and
- ✓ holding discussions with safety and health representatives (if any).

c) What are new and young workers' responsibilities for workplace safety and health?

To work safely:
Look after yourself and others by:

- ✓ following all reasonable instructions for doing the job;
- ✓ following workplace procedures;
- ✓ not putting yourself or your workmates at risk;
- ✓ wearing personal protective clothing and equipment (PPE) as required; and
- ✓ reporting unsafe situations and injuries to your supervisor, employer and/or safety and health representative (if there is one).

To ask if you're not sure:
Find out how to do things safely by:

- ✓ taking the induction and training seriously;
- ✓ knowing and following the safety and health requirement of your job; and

- ✓ if you are not sure how to do something safely, asking for help or training before you start the task.

Work is important, but your life is more important. Some ways you could ask your supervisor for help are to ask questions like:

- ✓ 'I'm not sure how this works, could you spare a few minutes to show me again?'
- ✓ 'I think I've got the hang of this, but can you watch to make sure I'm doing everything right?'
- ✓ 'I'm still a bit uncomfortable with this, would you mind explaining it/or showing it to me again?'

To report your concerns:

If you are concerned about your own or your co-workers' safety and health:

- ✓ talk to your supervisor, employer and/or safety and health representative (if there is one) straight away – this might about slippery floors, lifting heavy loads, faulty or unguarded machinery and equipment, chemicals, bullying, violence or fatigue;
- ✓ talk to one of your more experienced co-workers;
- ✓ if you work through a group training organisation or labour hire agency, report your concerns to them, as well;
- ✓ if you are a work experience or structured workplace learning student, you should also speak to your teacher or trainer about your concerns;
- ✓ where attempts to resolve a safety and health issue at work have not succeeded and you think there is a risk of imminent and serious injury or harm to health, you can contact WorkSafe and request an inspector attend the workplace; and/or
- ✓ where attempts to resolve a safety and health issue at work have not succeeded and there is no risk of imminent and serious injury, you can contact WorkSafe for advice. If you wish an inspector to attend the workplace, your request will be considered – you can request that WorkSafe does not release your name to your employer.

5. Training Issues:

When training young employees to work safely, be sure trainers:

- ✓ Provide clear instructions on the procedures to follow, including specific safety precautions. Trainers should always explain why these procedures and precautions are necessary.
- ✓ Ask the young worker to repeat the instructions, and then ask for and respond to any questions.
- ✓ Show the trainee how to perform the task correctly and safely.
- ✓ Ask the trainee to perform the task while the trainer watches.
- ✓ Correct any mistakes, asking for and answering any questions.
- ✓ Check back periodically to make sure young workers is still performing the task correctly and safely. Supervisors should always monitor closely for a few days after training and be especially alert for any risk-taking behavior, step skipping, etc.

When training young workers for a job that involves using or working around any hazardous equipment, be sure trainers demonstrate how to use the equipment safely and explain such essential safety precautions as:

- Required PPE
- Proper use of machine guards
- Procedure for starting and stopping equipment
- Emergency features
- Procedures for feeding and removing materials safely
- How to report equipment problems

- Leaving machine and electrical repair and maintenance to trained, authorized people

6. Supervision of Young Workers:

Supervisors play a critical role in protecting young workers on the job. To provide that essential safety net, your supervisors have to be trained to work effectively with young workers and recognize how they may be different from adult employees.

Supervisors should be trained to:

- Provide proper safety orientation for all new employees
- Spend more time explaining the job
- Never assume skills or knowledge of safety hazards
- Provide lots of positive feedback (and correction when necessary) on safety performance
- Emphasize the specific risks and the importance of safety precautions
- Supervise young employees closely for the first couple of months
- Be available to answer questions those first crucial weeks on the job
- Assign an experienced employee to mentor the young worker

Set a good example for young workers (e.g., always using proper PPE and following all the work rules employees are expected to follow)

- ❖ Tell young workers to ask about any hazard or procedure they're unsure of
- ❖ Make sure young workers understand there's no such thing as a "dumb" question about safety
- ❖ Make sure young workers understand emergency procedures and know evacuation routes

My faith is in younger generation, the modern generation, out of them will come my workers!
By Swami Vivekananda

File Source:

https://www.commerce.wa.gov.au/worksafe/safety-tips-new-and-young-workers-and-their-employers

www.miningsafety.co.za/dynamiccontent/87/Young-Workers-Safety-at-Mines

Hazard prevention and control in the work environment: Airborne dust

Partha Sarathi Maji
Budawada Limestone Mines
UltraTech Cement Limited

Purpose

Airborne contaminants can occur in the gaseous form (gases and vapours) or as aerosols, which include airborne dusts, sprays, mists, smokes and fumes. Airborne dusts are of particular concern because they are associated with classical widespread occupational lung diseases such as the pneumoconioses, as well as with systemic intoxications such as lead poisoning, especially at higher levels of exposure. There is also increasing interest in other dust-related diseases, such as cancer, asthma, allergic alveolitis and irritation, as well as a whole range of non-respiratory illnesses, which may occur at much lower exposure levels. This document has, therefore, been produced to aid dust control and the reduction of disease.

Whenever people inhale airborne dust at work, they are at risk of occupational disease. Year after year, both in developed and in developing countries, overexposure to dusts causes disease, temporary and permanent disabilities and deaths. Dusts in the workplace may also contaminate or reduce the quality of products, be the cause of fire and explosion, and damage the environment.

Recognizing the problem

Definitions and examples

Dusts are solid particles ranging in size from below 1 µm up to around 100 µm, which may be or become airborne, depending on their origin, physical characteristics and ambient conditions. This document does not deal specifically with other aerosols (such as fumes and mists), with very fine particles resulting from chemical reactions in the air, or with air pollution outside the workplace. However, in many cases similar principles of control apply to these as to dusts.

Examples of hazardous dusts in the workplace include:

- mineral dusts from the extraction and processing of minerals (these often contain silica, which is particularly dangerous);
- metallic dusts, such as lead and cadmium and their compounds;
- other chemical dusts, such as bulk chemicals and pesticides;
- vegetable dusts, such as wood, flour, cotton and tea, and pollens;
- moulds and spores.

Asbestos is a mineral fibre, which is particularly dangerous, and is found, for example, in maintenance and demolition of buildings where it had been used as insulation material.

Size fractions

In occupational hygiene, particle size is usually described in terms of the aerodynamic diameter, which is a measure of the particle's aerodynamic properties. Whether or not an airborne particle is inhaled depends on its aerodynamic diameter, the velocity of the surrounding air, and the persons' breathing rate. How particles then proceed through the respiratory tract to the different regions of the lungs, and where they are likely to deposit, depend on the particle aerodynamic diameter, the airway dimensions and the breathing pattern. If a particle is soluble, it may dissolve wherever it deposits, and its components may then reach the blood stream and other organs and cause disease. This is the case, for example, of certain systemic poisons such as lead. There are particles which do not dissolve, but cause local reactions leading to disease; in this instance, the site of deposition makes a difference. When a relatively large particle (say 30 μm) is inhaled, it is usually deposited in the nose or upper airways. Finer particles may reach the gas-exchange region in the depths of the lungs, where removal mechanisms are less efficient. Certain substances, if deposited in this region, can cause serious disease, for example, free crystalline silica dust can cause silicosis. The smaller the aerodynamic diameter, the greater the probability that a particle will penetrate deep into the respiratory tract. Particles with an aerodynamic diameter > 10 μm are very unlikely to reach the gas-exchange region of the lung, but below that size, the proportion reaching the gas exchange region increases down to about 2 μm.

The depth of penetration of a fibre into the lung depends mainly on its diameter, not its length. As a consequence, fibres as long as 100 μm, have been found in the pulmonary spaces of the respiratory system.

Whenever exposure to airborne dust needs to be quantitatively evaluated, instruments must be used which select the right size range for the hazard concerned. There are conventions for the size ranges of particles to be measured; it is usual to collect either the inhalable fraction, i.e. everything that is likely to be inhaled, or the respirable fraction, i.e. the particles likely to reach the gas-exchange region of the lung. For example, if silica is present, it is necessary to measure the respirable fraction of the airborne dust.

Dust generation

Mineral dusts are generated from parent rocks by any breaking down process, and vegetable dusts are produced by any dry treatment. The amount, hence the airborne concentration, is likely to depend on the energy put into the process. Air movement around, into or out of granular or powdered material will disperse dust. Therefore handling methods for bulk materials, such as filling and emptying bags or transferring materials from one place to another, may constitute appreciable dust sources. Coarse materials usually have a dust-sized component as a result of attrition. If dust clouds are seen in the air, it is almost certain that dust of potentially hazardous sizes is present. However, even if no dust cloud is visible, there may still be dangerous concentrations of dust present with a particle size invisible to the naked eye under normal lighting conditions.

Unless its generation is prevented or it is removed from the air, dust may move with ambient air and reach even persons who are remote from the source and whose exposure is unsuspected.

Damp materials are less likely to release airborne dust, but of course this does not apply if they dry up later.

Sources of exposure

Work processes likely to generate dust include the following:

- mining, quarrying, tunnelling, stone masonry, construction, and any process which breaks or separates solid material;
- foundries and other metallurgical processes, especially the cleaning of casting

- and breaking of moulds;
- any process using abrasive blasting, such removal of paint and rust, cleaning of buildings and small objects, and etching of glass (N.B., use of sand for these processes is often unnecessary, and if uncontrolled can cause serious health impairment, and even fatalities, among the operators, even in a few months);
- manufacture of glass and ceramics;
- handling of powdered chemicals in the chemical, pesticide, rubber manufacturing and pharmaceutical industries;
- agricultural work involving exposure to soil, intensive animal husbandry, dry vegetable products, or agro-chemicals;
- food processing, especially where flour is used;
- any process involving weighing, bagging, bag-emptying or dry transport of powdered or friable materials.

Control approaches and strategies

The prevention of occupational hazards is much more effective and usually cheaper if it is considered at the planning stage of any work process and workplace, rather than as control solutions of already existing hazardous situations. This applies first to the planning of new processes or factories, to ensure that hazardous substances are only used if necessary. If they are necessary, then emissions inside and outside the workplace, as well as waste generation, should be minimized, considering the whole life of the process and the products. The workplace and the job should be planned so that hazardous exposure is either avoided or kept to an acceptable minimum. Incentives should reward work practices which minimize exposure. The same considerations should apply to the introduction of new or modified processes and procedures. The order of priority should be to:

- "Plan out" the exposure, by not using hazardous substances, or using them in such a way that no one is exposed;
- If (1) does not completely prevent exposure, then prevent or minimize emission of the substances to the air;
- If it is not possible to prevent exposure by any other method, then give personal protective equipment, including respiratory protective equipment (RPE), to the workers and other persons, as needed.

It is essential to adequately plan for supervision and maintenance, in order to ensure that controls are used and continue to be effective. Workplace control of exposure must be integrated with other measures, such as control of emissions to the atmosphere and waterways, and waste disposal, so that all these measures work together. (Of course, elimination of the hazardous substances prevents all these problems.) Similarly, the control of any hazardous substance in the workplace should be part of an integrated control system encompassing other hazards, such as noise and heat, as well as the ergonomic design of tasks and workplaces.

Prevention and control measures should not be applied in an ad hoc manner, but integrated into comprehensive, well-managed and sustainable programmes at the workplace level, involving management, workers, production and occupational health professionals.

Elimination at the source

Elimination at the source can involve three different items: the production process, the hazardous substance and the work practices. A production process can be changed by applying a production method which generates less dust. This is a sensible approach at the design stage of a production process or when production lines are changed due to the introduction of new product lines.

A hazardous substance may be eliminated by changing the process so that the substance is no longer needed, or by using a less hazardous substance as a substitute. It is, of course, necessary to assess all of the effects of the change, taking into account other hazards such as noise, and any effects on the performance of the product, particularly effects on its safety. If substances are changed, it will be necessary to assess and control any eventual new risks.

If substitution is not feasible, ways should be sought of reducing dust generation. For example, substances might be used as pellets or in liquid suspension, rather than as powders, or, brought in as pre-formed blocks, rather than being cut in the workplace. Any wet method is likely to cause less dust exposure than a dry one. In breaking and drilling, it is much more effective to keep the substance wet at the point of dust generation than to try to capture already airborne dust by spraying it. Moreover, it is necessary to prevent subsequent drying out of dusty material, eventual slipping hazards due to wet surfaces, electrical hazards, and heat stress from the increased humidity. It is also necessary to plan for the adequate disposal of any contaminated liquid effluent.

Containment and ventilation

Containment consists in placing a physical barrier between the substance and people, for example putting a process inside a box. It is usually necessary to have a ventilation system that keeps the enclosure under negative pressure, so that there is no emission at cracks or at points where material moves in or out of the enclosure. The design should be such that maintenance and cleaning can be performed without causing high exposure; unplanned breakdowns, which may tempt workers to open the enclosure, should be foreseen.

It may be satisfactory to partially enclose a process, for example, by having an opening at the front of an enclosure for the operator to reach in (however, the worker's breathing zone should never be between the contaminant source and the hood). Effective design is difficult, because the flow of air into the opening must be sufficient to prevent escape of the airborne material, including when people move across the opening.

Local exhaust ventilation is the removal of airborne contaminants, close to their source of generation or release, before they can spread and reach the worker's breathing zone. For this, it is necessary to ensure that the airflow is sufficient and its direction appropriate, particularly where the process generates air movement, such as a grinding wheel, or a hot process. For the same exhaust volume, the velocity of air being drawn towards the hood opening rapidly decreases with the distance (from the opening); considering that a minimum air velocity is required to ensure the capture of an airborne contaminant, it follows that the hood must be as close as possible to the point of dust generation.

General ventilation is usually desirable to control the temperature and humidity of the environment, and a properly designed system can act as a back-up control of exposure to airborne substances, by providing continual dilution of any accidental emissions. In certain cases, general ventilation can be used to control widely disseminated low toxicity contaminants.

Ventilation must be so designed that movements of personnel and vehicles, or the opening of doors and windows, cannot jeopardize its effectiveness. The design of ventilation systems should always be the responsibility of specially trained professionals. The task is particularly difficult where one fan exhausts from a set of ducts and hoods (multi-hood systems). It is easy to accidentally arrange a system so that very little air is exhausted from one or more of the openings, or to badly design a ductwork system so that it has an unnecessarily high resistance to flow. The design of the ductwork must take into account the need for cleaning (which may involve exposure of the cleaning staff) and the abrasive effect of dust.

It is necessary to ensure that ventilation does not move contaminated air to unsuspecting workers downstream, and that hazardous substances are not exhausted to the general environment in an unplanned and undesirable way. When dealing with toxic contaminants, air cleaning devices must be incorporated in ventilation systems, in order to prevent their discharge to the outside environment, and also to prevent re-circulation to the workplace. The disposal of collected toxic dusts must be controlled so as to minimize exposure of the responsible workers and avoid environmental effects.

Work practices

The manner in which a worker performs a task can appreciably affect exposure, so it is important to train workers in good work practices. Video recording of tasks, with simultaneous measurement of airborne concentrations, can be a useful tool for designing and training in adequate work practices. In the case of dusts, it may be effective (and cheaper) to use a dust lamp to make the dust visible, and to use this in conjunction with video filming. Work practices which affect exposure include:

- the manner in which containers are handled and lids removed;
- the care taken in transferring dusty materials;
- work speed; and
- the way in which empty containers are handled.

If the material is likely to offer an ingestion hazard, smoking, eating and drinking in the workplace should be forbidden; such activities should be restricted to designated areas, with adequate washing facilities. Personal care, including teeth brushing, washing hands and cleaning nails, showering and washing hair, before eating and after the work are important measures whenever there is the possibility of dust contamination. Workers must be properly trained about the hazards and risks from the substances used, the control measures, and any exposure monitoring. The workers are often the people who have the fullest knowledge of what happens during work, and their views should be sought on what leads to exposure and the effectiveness of control.

Personal measures

Every attempt should be made to avoid or minimize exposure by other methods before resorting to personal protective equipment (PPE), especially respiratory protective equipment (RPE). A respirator, particularly of the mask type, is not easy to wear for long periods; it can be very uncomfortable, especially in hot or cramped conditions, and workers may be tempted to remove it. Moreover, uncontrolled airborne dust may spread and affect people who are distant from the task, so it is better to prevent the occurrence of dust exposure in the first place. Another problem is that PPE is fallible, and may not give the protection assumed; moreover, it offers no environmental protection. Finally, PPE and especially RPE must be conscientiously cleaned and maintained to remain effective, which often makes them a costly option; poor maintenance makes any PPE ineffective.

Nevertheless, there may be some operations, such as cleaning and maintenance, where PPE is the only practical control method. It is very important that such equipment be selected by trained personnel, taking into account the type of hazardous materials it should protect from, the nature of the work, the expected exposure, and the facial characteristics of the wearers; proper fit is of paramount importance. Workers, supervisors and maintenance staff must be properly trained in the use, maintenance and limitations of the equipment.

The tasks for which PPE is prescribed should be periodically re-assessed to see if other control measures have become applicable. Gloves and other skin protection are necessary if the dust may pose a hazard through skin absorption or ingestion, or can have a direct effect on the skin.

Environmental protection

Prevention and control systems should be designed to protect both workers' health and the general environment. Environmental consequences include the effect of fine particles on atmospheric visibility, damage to buildings, effects on vegetation and animals, and health effects on people outside the plant. As in the workplace, the first priority is to prevent the generation of airborne dust, and, if generation cannot be prevented, then secondly, its removal. Measures that minimize waste generation should be given priority, and any inevitable waste disposal should be so planned as to avoid environmental damage.

Mines Resumes

LAKSHMIPURAM LIMESTONE MINE

M/s. THE INDIA CEMENTS LIMITED, VISHNUPURAM

MINE RESUME

Name of the Mine	: Lakshmipuram Limestone Mine
Name of the Mineral	: Limestone
Name of the Owner	: Smt. Lakshmi Aparna Sreekumar
Name of the Agent	: Sri M. Tirupati Rao
Name of the Manager	: Sri A.J. Reddy
Location & Address	: M/s The India Cements Limited Lakshmipuram Limestone Mine Irkigudem Village Damaracherla Mandal Nalgonda District Telangana State
Total Mining Lease area	: 417.04 hectares
Total reserves (111 and 121 & 122)	: 97.324 million tonnes
Production during 2016-17	: 6.67 lakh tonnes
Stripping ratio	: 1:0.01
Powder factor	: 9.27 t/kg
Productivity (OMS)	: 74 metric tonnes
No. of persons employed	: 30
No. of shifts operated	: 01
Mine is operated by mechanized / Semi – mechanized / manual method	: Mechanised

VISHNUPURAM LIMESTONE MINE

M/s. THE INDIA CEMENTS LIMITED, VISHNUPURAM

MINE RESUME

Name of the Mine	: Vishnupuram Limestone Mine
Name of the Mineral	: Limestone
Name of the Owner	: Smt. Lakshmi aparna sreekumar
Name of the Agent	: Sri M. Tirupati Rao
Name of the Manager	: Sri P.BheemRaj
Location & Address	: M/s The India Cements Limited Vishnupuram Limestone Mine Wadapally Village Damaracherla Mandal Nalgonda District Telangana State
Total Mining Lease area	: 316.47 hectares
Total reserves (111 and 121 & 122)	: 8.181 million tonnes(as on 01.04.2018)
Production during 2017-18	: 10.23 lakh tonnes
Stripping ratio	: 1:0.03
Powder factor	: 9.95 t/kg
Productivity (OMS)	: 110
No. of persons employed	: 30
No. of shifts operated	: 02
Mine is operated by mechanized / Semi – mechanized / manual method	: Mechanised

KRISHNAPURAM LIMESTONE MINE

M/s. THE INDIA CEMENTS LIMITED, VISHNUPURAM

MINE RESUME

Name of the Mine	: Krishnapuram Limestone Mine
Name of the Mineral	: Limestone
Name of the Owner	: Sri V. Manickam
Name of the Agent	: Sri M. Tirupati Rao
Name of the Manager	: Sri Ch. Srinivas
Location & Address	: M/s The India Cements Limited Krishnapuram Limestone Mine Pondugala Village Dachepalli Mandal Guntur District Andhra Pradesh State
Total Mining Lease area	: 652.10 hectares
Total reserves (111 and 121 & 122)	: 35.598 million tonnes
Production during 2017-18	: 8.072 lakh tonnes
Stripping ratio	: 1:0.02
Powder factor	: 8.58 t/kg
Productivity (OMS)	: 102 metric tonnes
No. of persons employed	: 37
No. of shifts operated	: 01
Mine is operated by mechanized / Semi – mechanized / manual method	: Mechanised

CHAANAKYA CEMENTS LIMESTONE MINE
OF
M/s. PENNA CEMENT INDUSTRIES LIMITED
STATUS OF THE MINE

Name & Location of the Mine	: **Chaanakya Cements Limestone Mine** M/s. Penna Cement Industries Limited Ganeshpahad (V), Wadapally (Po) Dameracherla (M), Nalgonda (Dt.) 508355
Name of the Mineral	: Limestone
Name of the Owner	: Shri D. Lakshmi Kantham, Director
Name of the Agent	: Shri. V. Guru Murthy, General Manager (W)
Agent Phone Number	: +919490162200
Agent Mail ID	: ganeshpahad@pennacement.com
Name of the Manager	: Shri. M. Ramchander , A.G.M. (Mines)
Manager Phone Number	: +918096900267
Manager Mail ID	: ganeshpahad@pennacement.com
Name & Address of the Lessee	: M/s. Penna Cement Industries Limited Lakshmi Nivas, Plot No. 705 Road No. 3, Banjara Hills, Hyderabad, Telanagna-500034 Ph No. 040-44565100/400
Extent of Mining Lease in Hectares	: 354.10 ha (875 acres)
Date of Opening of Mine	: 22.02.2002
Total Reserves	: 161.0 million tonnes
Production during **2016-17**	: 12,44,856 M.T.
No. of Persons employed	: 44 persons
No. of Shifts operated	: 02 Shifts
Mine is operated by Mechanized/ Semi-Mechanized/Manual Method	: Fully Mechanized
Current status of the Mine	: **Working Mine (under "A" group category)**

DETAILS OF THE AREA:-

Chaanakya Cements Limestone Mine is a captive mine of M/s. Penna Cement Industries Ltd situated in Ganeshpahad (V), Dameracherla (M), Nalgonda Dist. The subject Mining lease area is about 80 KM due South-East Nalgonda town and district headquarters. Nalgonda town, in turn, is located at about 100 KM due South-East to Hyderabad city. In essence, the Mining lease area is located at about 180 KM due South-East of Hyderabad and is well connected by asphalt roads. Its geographical co-ordinates are North latitudes

16° 43' & 16 ° 43' 30" and East longitudes 79 ° 42' & 79 ° 43' 15" in the survey of India topo sheet No.56P/10. The nearest Railway station is Vishnupuram, (13 Kms.) and located in the South-West of our ML area, Nalgonda Dist. The nearest town is Miryalaguda, two approaches are there to reach the subject area. One is 25 KM via Dameracherla and 48 KM via Nereducherla from Miryalaguda town.

TOPOGRAPHY:

The Mining lease area has gently undulating topography with slope towards the Musi and the Krishna Rivers, which are respectively to the west and south of the area. The eastern part is relatively higher in elevation than the western part. The maximum and minimum levels in the area are 95 mtrs and 56 mtrs with an average altitude of 76 mtrs. The maximum relief in the subject area is 38 mtrs. The ground water in the subject area is very deep, more than 35 mtrs, despite the presence of the two perennial rivers in the vicinity. This may be attributed to a lack of porous water bearing litho unit below the limestone.

BRIEF DESCRIPTION OF GEOLOGY OF DEPOSIT :

A major proportion of the area is occupied by the youngest unit viz. the off white limestone and is succeeded by the older units towards west. The lowest unit is exposed within and on the slopes on either side of the Musi River bed. The disposition of the litho units, nearly parallel to the topo graphic levels (contours) implies that the beds are sub horizontal. They show, at places, very gentle easterly 5^{O} dips. The litho units have a general NNE-SSW trend.

Limestone unit has frequent purple shale partings. The green limestone is succeeded by the grey limestone with a gradational contact. The analytical results show that the green and grey limestone have similar chemical characteristics and hence they both are combined under a common name 'direct feed grade limestone' where necessary.

DESCRIPTION OF MINING MECHINERY DEPLOYED:

S. No	Equipment	Make	Model	Capacity	Numbers in use
1	Excavator	Tata	EX – 450	3.00 M^3	02
2	Dumpers	BEML	BH-35	35 MT.	05
3	Electrical Compressor	Chicago Pneumatic	SS120P	400 cfm	01
4	Drill Machine	Ingersol-Rond	CM-341	115 mm dia	01
5	Dozers	BEML	D-155	440 HP	01
6	Water Tanker	Ashok Leyland	2516	15 KL	01
7	Explosives Van	Eicher	10.90	5.0 M.T.	01
9	Ambulance	Tata	Euro III	--	01

Technical Information of
BHAVANIPURAM LIMESTONE MINE of
M/S. DECCAN CEMENTS LIMITED

1) Name of the mine	:	Bhavanipuram Limestone Mine
2) Name of the company	:	M/s. Deccan Cements Limited.
3) Name of the Owner	:	Sri R.Gopalakrishnan
4) Name of the Agent	:	Sri S.Venkateswarlu
5) Name of the Manager	:	Sri D.Kalyan Chakravarthy
6) Location of the Mine	:	Bhavanipuram, Janpahad - Post, Palakaveedu - Mandal, Suryapet - Dist., TELANGANA – 508 218.
7) Lease hold area	:	257.04 Hects.
8) Mine opening date	:	07.08.2000
9) Lease valid up to	:	08.02.2050
10) Total Mineable reserves	:	95 million tones
11) Life of the mine	:	47 Years
12) Production per day	:	7,600 MT
13) Production in the year 2017 – 18	:	17,47,000 MT
14) Shift timings	:	Two Shifts
15) Mailing address	:	Post Box No.1, Miryalaguda, Nalgonda Dist., TELANGANA – 508 218.
16) Regd. Office address	:	"DECCAN CHAMBERS" 6-3-666/B Somajiguda, Hyderabad TELANGANA – 508 218.

TECHNICAL RESUME: -

Details of the Area: -

Bhavanipuram Limestone Mine is a captive mine of M/s. Deccan Cements Limited situated

in Saidulnama Reserve Forest of Janpahad, Palakaveedu - Mandal, Suryapet – District, Telangana - State. The subject mining lease area is located at about 190 km due southeast of Hyderabad and is well connected by asphalt roads. The nearest Railway station is Janpahad (2 km). The subject area is situated at about
4.5 Kms. due North – East of the confluence point of Musi and Krishna Rivers, 2.3 Kms. due NNE of Mahankaligudem village. Its geographical co-ordinates are North latitudes 16° 42' 04" & 16° 42' 59" and East longitudes 79° 42' 03" & 79° 42' 45" in the survey of India topo sheet No.56P/10. Two approaches are there to reach the subject area. One is 13 Kms. from Damarcharla and the other is 23 Kms. from Nereducharla.

GEOLOGY AND EXPLORATION

Physiography: -

The area is a gently undulating terrain. Towards the south is a topographic-low around the grid intersection N1200/W200. From this 'low', the rise in elevation is gradual, towards NNW and northeast. Relief within the lease area is 23 m confined to the altitudinal range of 63 m to 86 m above MSL.

The entire area is replete with outcrops of carbonate rocks. There is hardly any topsoil. Occasionally, however, soil filling the wide joints in limestones, may beseen.

Krishna River flowing to the south and Musi River flowing to the west constitute not only the main surface water sources but also the main drainage base, to the area.

Geology: -

The area forms a part of the Proterozoic Palnad basin. Carbonate rocks belonging to the Narji limestone formation of Kurnool Group (Kadapa super group) occur per force in the area situated to the north of Krishna River in Suryapet district, of which the subject leasehold forms a tiny part. In the subject area comprising
257.04 hectares, there occurs, towards the eastern boundary (of the area), outcrops of carbonate rocks manifesting assorted colours viz., buff, cream, light grey, green, greyish green, chocolate brown etc. Which, together, are grouped and christened as Variegated Limestone for brevity in descriptive nomenclature. This particular litho-units occurs immediately overlying the most promising steel grey limestone in the entire Palnad basin in Suryapet district (Telangana), north of Krishna River. Outcrops of steel grey to dark grey limestones occur per force in the rest of the area. These litho-units have been traced and plotted in the Geological Plan. The area is rocky surface and top soil cover is negligible.

No waste or sub-grade mineral is produced in the mine. Overburden generated small quantities area kept and secured in regular manner. Quarry area, colony and factory sites have been extensively afforestated. Considerable green belt has been developed all along the main road and east side of the quarry.

Wet drilling is done to control the dust emission. Drill operators, Shovel operators and Tipper drivers are provided with dust masks. Continuous wetting of haul road is done by one water tanker with 12 KL and another with 8 KL capacity. To mitigate the impact of blast induced ground vibrations, controlled blasting techniques such as pre- splitting and deck charging are used. Blast vibrations are monitored by a seismograph and recorded regularly. Nonel initiating system is used and the maximum charge per delay is restricted to keep the peak particle velocity in safe limits.

LIST OF MINING MACHINERY

Sl. No.	Type of Machinery	Capacity each unit	No. of Units	H.P. of each unit	Electrical/ Non-Elect.	Used in O.C./U. Ground (Specify)
1.	TATA Hitachi Hydraulic ZAXIS-470 H	3.1 Cum.	01	320	Non-Elect.	Open cast
2.	L&T Komatsu Hydraulic Excavator Model PC 300 LC-7	2.1 Cum.	01	242	Non-Elect.	Open cast
3.	TATA Hitachi Hydraulic Excavator Model EX-350	1.5 Cum.	01	230	,,	,,
4.	TATA Hitachi Hydraulic Excavator Model EX-350 with Atlas Copco Rock breaker Model: HB 2200	30 Tons	01	230	,,	,,
4.	BEML Dozer BD65-1	3.6 Cum.	01	165	,,	,,
5.	BEML Dumper BD 35 - 2	35 Tones	05	380	,,	,,
6.	Atlas Copco Compressor Model XAH 210	445 cfm	03	180	,,	,,
7.	Atlas Wagon Drill Model BVB 25-10	115 MMΦ	03	-	,,	,,
8.	Explosive Van TATA 407 Turbo Ex	3310 Kgs.	01	75	,,	,,
9.	Water Tanker TATA LPK 2518 TC	12 KL	01	180	,,	,,
10.	Water Tanker TATA LPK 1615 TC	8 KL	01	180	,,	,,
11.	Mahindra Bolero Camper	1710 kg.	01	46	,,	,,
12.	Lighting Tower	5 KVA	01	11	,,	,,
13.	Solar Lighting Tower	600w	04	150w	,,	,,

MINE RESUME

1. Name of the mine : **MATTAPALLI LIMESTON MINE**
2. Location of the Mine : Mattapalli (V), Suryapet-Dist.
3. Name of the Mineral : Limestone
4. Name of the Owner : M/s NCL Indsustries Ltd
5. Name of the Agent : Sri S.Chakradhar
6. Agent phone No : 040-23203637.
7. Agent mail id : nclworks@nclind.com
8. Name of the Manager : Sri.A. Mahipal Reddy.
9. Manager phone No : 7095020888.
10. Manager mail id : mines@nclind.com,
11. Postal address : NCL Indus ltd,
    Mattampalli (Md),
    Suryapet (Dist), Telengana.
12. Extent of mining Lease : 46.356 ha
13. Date of opening the mine : 05/06/1998
14. Total Reserves : 25.17 Million tons
15. Production 2016 : 8, 77,100 tons
16. Stripping ratio : Nil
17. No. of shifts operated : Two
18. Mine is operated by : Mechanized

Brief description of deposit : The area forms a part of palnad basin comprising upper protozonic strata, litho-units belongs to the Kurnool group and correlate to the nirji Limestone formation. Out crops of gray to dark gray, medium bedded limestone are ubiquitous.

Description of the machinery deployed.

SI No	EQUIPMENT	MAKE	MODEL	CAPACITY	No's
1	Hydraulic Excavator/Shovel	Tata Hitachi	Zaxis 470	3.1 M^3	1
			Zaxis 220	1.2 M^3	1
2	Tippers	Ashok Leyland	2516T	17 MT	10
3	Compressor	Atlas capco	XAH-185	445 Cfm	1
4	Wagon Drill	Atlas capco	BVB -25	115 mm	1
5	Dozer	BEML	D-80-A-12	30 tons	1
6	Rock Breaker	Tata Hitachi	Zaxis 200		1
7	Water Tanker	Ashok Leyland	6534	20 KL	1
8	Explosive Van	Swaraj Majda	ZT-54	06 tons	1

MINE RESUME

1. Name of the mine : **SULTANPUR THANDA – GUNDLAPALLI LIMESTONE MINE**
2. Location of the Mine : Gundlapally (V), Suryapet -Dist.
3. Name of the Mineral : Limestone
4. Name of the Owner : M/s NCL Industries Ltd
5. Name of the Agent : Sri S.Chakradhar.
6. Agent phone No : 040-23203637.
7. Agent mail id : nclworks@nclind.com
8. Name of the Manager : Sri.G S Subba Rao
9. Manager phone No : 9390801057.
10. Manager mail id : mines@nclind.com,
11. Postal address : NCL Industries ltd,
    Mattampalli (Md),
    Suryapet (Dist), Telengana.
12. Extent of mining Lease : 173.2 ha
13. Date of opening the mine : 09/03/1992
14. Total Reserves : 32.92 Million tons
15. Production 2017 : 9, 92,000 tons
16. Stripping ratio : Nil
17. No. of shifts operated : One
18. Mine is operated by : Mechanized

Brief description of deposit : The area forms a part of palnad basin comprising Precambrian Protozonic srtrata.Lithounits belonging to the Jammalamadugu series of Kurnool system and Co relatable to nirji Limestone formation occur in and around the area. The carbonate rocks do manifest litho-facies variations both along and across the strike. These variations, in turn, account for the qualitative fluctuations in the Limestone.

Description of the machinery deployed.

Sl No	EQUIPMENT	MAKE	MODEL	CAPACITY	No's
1	Hydraulic Excavator/Shovel	Tata Hitachi	Zaxis 220	1.2 M^3	2
2	Tippers	Ashok Leyland	2516T	17 MT	10
3	Compressor	Atlas capco	XAH-185	445 Cfm	1
4	Wagon Drill	Atlas capco	BVB -25	115 mm	1
5	Dozer	BEML	D-80-A-12	30 tons	1
6	Water Tanker	Ashok Leyland	6534	12 KL	1
7	Explosive Van	Swaraj Majda	ZT-54	06 tons	1

CHOUTAPALLY LIMESTONE MINE

M/s. MY HOME INDUSTRIES PRIVATE LIMITED

MINE RESUME

Name & Location of the Mine	:	Choutapalli Limestone Mine
Name of the Mineral	:	Limestone
Name of the Owner	:	Chandrasekhar Pandey, Nominated Owner
Name of the Agent	:	Vijay Keshav Chakunde
Agent Phone Number	:	8096508090
Agent Mail ID	:	vijaychakunde@myhomegroup.in
Name of the Manager	:	K. Srinivasa Rao
Manager Phone Number	:	8096508092
Manager Mail ID	:	ksrao@myhomegroup.in
Postal Address	:	Srinagar, Mellacheruvu-508 246 Suryapet district, Telangana.
Extent of Mining Lease in Hectares	:	262.247 Hectares.
Date of Opening of Mine	:	27.11.2006.
Total Reserves	:	Proved (111) : 45.979 Probable (121) : 2.553 Remaining Resource: 33.793 **Total** **82.325**
Production during 2017-18	:	16,24,128 MT
Stripping Ratio	:	-Nil-
Powder Factor	:	7.88
Productivity (OMS)	:	67
No. of Persons employed	:	75
No. of Shifts operated	:	02
Mine is operated by Mechanized/ Semi-Mechanized/Manual Method	:	Mechanised
Brief description of Geology of Deposit	:	Annexure-III (Attached)
Special Achievements if any	:	Won overall 1st prize in MS&PC-2017, 2016 & overall 2nd Prize in 2015' A-Group Mines consecutively.

Description of Machinery deployed:

S.No.	Equipment	Make	Model	Capacity	Numbers
1	Excavators	Volvo	EC460B	2.5 M^3	01
2	Excavators	Sany	SY350LC	1.6 M^3	02
3	Dump-Trucks	Man Force	25/280	25 MT	10
4	Compressor	Doosan	HP450	470 cfm	01
5	Drill Machine	ATLAS COPCO	D45	115 mm	01
6	Explosive Van	TATA	LPT1616	9.14 MT	01
7	Rock Breaker	YONDA		135HP	01
8	Mobile Lighting Tower	IR	IR-Dis1600	4X1000W	01
9	Mobile Lighting Tower	SIGMA	SIGMA	9X400W	01
10	Tractor	Mahindra	M-570	95HP	01
11	Water pump	KSB	Submersible	37KW	01
12	Water pump	KSB	Submersible	42KW	01
13	Water Tanker	TATA	LPT1613	8 KL	01
14	BMD Truck	Ashok Leyland	1618T-XP	6MT	01

ANNEXURE - I

GEOLOGY OF THE DEPOSIT

The Geographical Location of the Choutapally Limestone Mine is situated at a distance of 3 Kms South - West of Mellacheruvu Village and 3 Kms south eastern side of Choutapally Village.

Its geographical co-ordinates are shown in the Survey of India Topo sheet No. 46P/13.

North Latitudes: 16° 46'18"
16 °48'25
East Longitudes: 79° 52'34"
79 °54'48"

The area is located in north eastern margins of the Cuddapah Basin is called "Palnad sub-basin". The geological formation in the area comprises of a sequence of arenaceous, argillaceous and calcareous rocks belong to the Kurnool group of rocks.

Kurnool systems of rocks are the youngest group of rocks in the Cuddapah Basin. These youngest rocks are formed in the Palnad area stretching on both sides of the Krishna River, called as Palnad, resting unconformable on the Cuddapah formation.

The limestone deposit within the mining leasehold area forms a part of Proterozoic Palnad basin equivalent of Narji Limestone formation of Kurnool group. These carbonate rocks or Narji Limestone formation is sub divided into several district lithological units.

↑ BC Soil
Grey Limestone
Green Limestone
Purple Shale

The general strike of the deposit is NNE-SSW to NE-SW trend with varying dips from 5° to 10° towards SSE/SE.

Quality of Limestone:

Total TCo_3 : 82 % – 86 %
SiO_2 : 8 % – 12 %

MY HOME LIMESTONE MINE

M/s. MY HOME INDUSTRIES PRIVATE LIMITED

MINE RESUME

Name & Location of the Mine	:	My Home Limestone Mine
Name of the Mineral	:	Limestone
Name of the Owner	:	Chandrasekhar Pandey, Nominated Owner
Name of the Agent	:	Vijay Keshav Chakunde
Agent Phone Number	:	8096508090
Agent Mail ID	:	vijaychakunde@myhomegroup.in
Name of the Manager	:	M. Appala Raju
Manager Phone Number	:	8096508093
Manager Mail ID	:	appalarajum@myhomegroup.in
Postal Address	:	Srinagar, Mellacheruvu-508 246 Suryapet district, Telangana.
Extent of Mining Lease in Hectares	:	141.644 Hectares.
Date of Opening of Mine	:	23-06-1996
Total Reserves	:	Proved (111) : 23.335 Probable (121) : 8.870 Remaining Resource: 8.950 **Total 41.155**
Production during 2017-18	:	15,72,351 MT
Stripping Ratio	:	-Nil-
Powder Factor	:	7.97
Productivity (OMS)	:	77
No. of Persons employed	:	72
No. of Shifts operated	:	02
Mine is operated by Mechanized/ Semi-Mechanized/Manual Method	:	Mechanised
Brief description of Geology of Deposit	:	Annexure-I (Attached)
Special Achievements if any	:	Won the individual prizes in MS&PC 2017 & and overall 2nd Prize in 2015

Description of Machinery deployed:

Sl. No.	Equipment	Make	Model	Capacity	Nos.
1	Excavator	Volvo	EC 460B	2.5 M^3	01
2	Excavator	SANY	SY350LC	1.6 M^3	02
3	Dump - Trucks	Man Force	Model CLA 25.280	25 MT	11
4	Compressor	DOOSAN	HP450	470 cfm	01
5	Drill Machine	ATLAS COPCO	ROC 203	115 mm	01
6	Explosive Van	Ashok Leyland	Cargo 759	3.2 MT	01
7	Rock Breaker	YONDA		135 HP	01
8	Tractor	MAHINDRA	Messy Ferguson	95 HP	01
9	Water pump	KSB	Submersible	37KW(50HP)	03
10	Water pump	KSB	Submersible	56KW(75HP)	01
11	Mobile Lighting Towers	I.R	IR-Dis 1600	4x100W	02
12	Water Tanker	Ashok Leyland	2518	10 KL	01

ANNEXURE - I

Geology of the Deposit

The Geographical location of the M/s. My Home Limestone Mine is 25 Kms from Kodad National Highway, N.H. 9 connecting Hyderabad – Vijayawada is passing through Kodad.
Its geographical co-ordinates are shown in the Survey of India, Topo Sheet No.56P/13.

North Latitudes : 16° 47' 51.8"
16° 48' 52.5"
East Longitudes : 79° 54' 53.4"
79° 55' 52.2"

The area is located in north eastern margins of the Kadapa basin, called "Palnad sub-basin". The geological formation in the area comprises of a sequence of arenaceous, argillaceous and calcareous rocks belonging to the Kurnool group of Rocks.
Kurnool system of rocks is the youngest group of rocks in the Kadapa Basin. These youngest rocks are formed in the Palnad area stretching on both sides of the Krishna River, called as Palnad resting unconformably on the Kadapa formation.
The limestone deposit within the mining lease hold area forms a part of Proterozoic Palnad sub-basin equivalent of Narji Limestone formation of Kurnool group. These carbonate rocks or Narji limestone formations are sub-divided into several distinct lithological units.

↑ Grey Limestone
Green Limestone
Purple Shale

The general strike of the deposit is NNE-SSW to NE-SW trend with varying dips from 5° to 25° towards SSE/SE.

Quality of Limestone:

Total TCo_3 : 80 % – 88 %
SiO_2 : 7 % – 13 %

MINE RESUME

NAME AND LOCATION OF THE MINE	:	SAGAR CEMENTS LIMESTONE MINE -1 MATTAMPALLY
NAME OF THE MINERAL	:	LIMESTONE
NAME OF THE OWNER	:	SRI. S. ANANDA REDDY
NAME OF THE AGENT	:	SRI. D.S.N.V.PRASAD
AGENT PHONE NUMBER	:	7997066111
AGENT MAIL ID	:	dsnvprasad@sagarcements.in
NAME OF THE MANAGER	:	SRI. V. SUBRAMANYAM
MANAGER PHONE NUMBER	:	9912229212
MANAGER MAIL ID	:	subramanyamv@sagarcements.in
POSTAL ADDRESS	:	MATTAMPALLY (MANDAL & VIL), SURYAPET (DT) TELANGANA (STATE) - 508 204
EXTENT OF MINING LEASE IN HACTARES	:	326.58
DATE OF OPENING OF MINE	:	18.08.1984
TOTAL RESERVES	:	65 MILLION TON
PRODUCTION DURING 2017	:	22, 86,900 TON
STRIPPING RATIO	:	NEGLIGIBLE
POWDER FACTOR	:	7.04
PRODUCTIVITY (OMS)	:	100.15 TON
NO. OF PERSONS EMPLOYED	:	43 - PERMANENT, 24 - CONTRACT
NO. OF SHIFTS OPERATED	:	02
MINE IS OPERATED BY MECHANISED/ SEMI-MECHANISED/MANUAL METHOD	:	MECHANISED
BRIEF DESCRIPTION OF GEOLOGY OF DEPOSIT	:	The area forms part of Palnaadu Basin belong into Narji formations of Jammalamadugu series of Kurnool group. The topography of the area is gently sloping with a relief of about 12m. There is stream flowing almost parallel to the strike of the beds i.e. NE – SW direction. The Mining Lease area is located in between 16°46'158'' and 16°47'00''North Latitude and 79°53'15'' and 79°54'00''Longitudes falling under survey of India Toto sheet No: 56P/ 13. Large Scale geological mapping was carried out; purple, green and dark grey Limestone out crops have been traced. Limestone beds are massive in general and showing a NE – SW trend, dipping due South East at shallow angles (2° to 6°).

SPECIAL ACHIEVEMENTS IF ANY : We procured dumpers and shovels in the year 2008 now these machines are look like brand new, this is only due to Good maintenance and operation of the equipment

DESCRIPTION OF MACHINERY DEPLOYED :

S. No	Equipment	Make	Model	Capacity	Numbers
1	SHOVEL	KOMATSU	PC - 1250-7	6.5 m^3	1
2	BACKHOE SHOVEL	VOLVO	EC 950 EL	6.0 m^3	1
3	LOADER	CAT	988H	6.9 m^3	1
4	DUMPER	KOMATSU	HD - 465	55 Tons	5
5	DOZER	KOMATSU	D 155A	11.8 m^3	1
6 a	BACK HOE SHOVEL	KOMATSU	PC - 200	0.9 m^3	1
b	BREAKER	ATLAS COPCO	MB – 1500	300 – 600 blows/min	1
7	COMPRESSOR (on mount drill)	ATLAS COPCO	ICM 260N	300 cfm	2
8	COMPRESSOR	ATLAS COPCO	XAH – 210	445 cfm	1
9	DRILL MACHINE	ATLAS COPCO	BVB 25/10	115 mm dia	1
10	EXPLOSIVE VAN	EICHER	EICHER 1110	7 MT	1
11	SOIL COMPACTOR	ESCORT	2420	33 Hz	1
12	SERVICE VAN	TATA	1510	---	1
13	PORTABLE LIGHTING TOWER	KIRLOSKER	SEKG 5AS - EA10	5 KVA	4
14	WELDING GENSET	ESAB	EDW 500	500 Amps	1
15	WATER TANKER	ASHOK LEYLAND	1616 IL	12 KL	1

ANJANI LIMESTONE MINE - I

M/s. ANJANI PORTLAND CEMENT LIMITED
(A Subsidiary of Chettinad Cement Corporation Limited)

1. Name of the Mine	: Anjani Limestone Mine-I
2. Name of the Mineral	: Limestone
3. Name of the Owner	: A. Subramanian
4. Name of the Agent	: Sri. N. Venkat Raju
5. Agent Phone Number	: 9949459997
6. Agent Mail ID	: nvr@anjanicement.com
7. Name of the Manager	: Sri. V. Ramachandram
8. Manager Phone Number	: 9949433528
9. Manager Mail ID	: vramachandram@anjanicement.com
10. Postal Address of the Mine	: Chintalapalem (V & M), Suryapet (D), Telangana State, PIN - 508 246.
11. Extent of Mining Lease in Acres	: 179.16
12. Date of the Opening of the Mine	: 15.12.1999
13. Total Reserves	: 26 Million Tons
Production during 2017	: 10, 60, 024.47 Metric Tons
14. Stripping Ratio	: Nil
15. Powder Factor	: 4.75
16. Productivity (OMS)	: 79 Tons
17. No. Of Persons Employed	: 32 No's
18. No. Of Shifts Operated	: 2 Shifts
19. Mine is operated by Mechanized / Semi-Mechanized / Manual Method	: Mechanized

20. Brief description of Geology of Deposit:-

The Geographical location of the Anjani Limestone Mine-I is 35 Kms from Kodad National Highway, N.H.65 connecting Hyderabad – Vijayawada is passing through Kodad. Its geographical co – ordinates are shown in the Survey of India, Topo Sheet No. 56 P /13.

North Latitudes :	East Longitudes
16^0 47′ 51.8″	79^0 54′ 53.4″
16^0 48′ 52.5″	79^0 55′ 52.2″

The area is located in north eastern margins of the Kadapa Basin, called "Palnadu Sub-basin". The geological formation in the area comprises of a sequence of arenaceous, argillaceous and calcareous rocks belonging to the Kurnool group of Rocks.

Kurnool systems of rocks are youngest group of rocks in the Kadapa Basin. These youngest rocks are formed in the Palnadu area stretching on the both sides of the Krishna River, called as Palnadu resting unconformably on the Cuddapah Formation.

The limestone deposit within the mining lease hold area forms a part of Proterozoic Palnadu basin equivalent to Narji Limestone formation of Kurnool Group.

The general strike of the deposit is ENE – WSW and NNE – SSW directions trend with dip of 5^0 to 20^0 towards South and East.

21. Special Achievements if any :

I. We are using Site Mixed Emulsion Explosive (SME) for Safe work environment for large blasts.

II. We are using Seismograph for measuring Ground Vibration and Noise for every Blast.

III. We have installed Two Peizometers in Mining Lease area for continuous monitoring of Ground Water level.

22. Description of Machinery deployed :

S.No.	Equipment	Make	Model	Capacity	Numbers
1.	Excavators	Hyundai	320 LC	1.7 M^3	01
2.	Excavators	L&T Komatsu	PC 300	2.91M^3	01
3.	Rock Breaker	Hyundai	HDP 210-9	-	01
4.	Dozer	SHANTUI	SD16	4.5/6.04CBM	01
4.	Compressor	ELGI	450 cfm	185 HP	01
5.	Wagon Drill	KRD	-	115 mm	01
6.	Explosive Van	EICHER	HHSD 4050	5.395 MT	01
7.	Water Tanker	Ashok Leyland	2516	10 KL	01

Sitapuram Limestone Mine of
M/s.ZUARI CEMENT LIMITED

Name & Location of the Mine	:	Sitapuram Limestone Mine, Zuari Cement Ltd., Dondapadu-508 246, Chintalapalem (Mandal), Suryapet (Dist.), Telangana.
Name of the Mineral	:	Lime stone
Name of the Owner	:	Sri Sushil Kumar Tiwari
Name of the Agent	:	Sri .G.Gopala Krishna Murthy
Agent Phone Number	:	08683 235333
Agent Mail ID	:	M.GOPALAKRISHNA@zcltd.com
Name of the Manager	:	Sri N.Hariprasad Rao
Manager Phone Number	:	7674974888
Manager Mail ID	:	n.hariprasadrao@zcltd.com
Postal Address	:	N.Hari Prasad Rao DGM (Mines), M/s Zuari Cement Ltd., Dondapadu-508 246, Chintalapalem (Mandal), Suryapet (Dist.), Teleangana.
Extent of Mining Lease in Hectares	:	1329.28 Hec.
Date of Opening of Mine	:	24.03.1986
Total Reserves	:	268.67Million Tons.
Production during 2017-18	:	12, 05,000 MT
Stripping Ratio	:	1:01
Productivity (OMS)	:	83.0
No. of Persons employed	:	41
No. of shifts operated	:	Two Shifts
Mine is operated by Mechanized	:	Mechanized
Brief description of Geology of Deposit	:	The Lime stone deposit occurring on the northern fringes of palnad basin forms a part of the Narji Limestone formation of Kurnool group. The Limestone beds have a general NE-SW trend With nearly 28^0 dip towards South East. The beds are in general fairly massive. These occur, thin bedded and flaggy strata associated with the massive beds.
Special Achievements if any	:	Dual Haul Road has formed for Dumpers movement
Description of Machinery deployed	:	

S.No.	Equipment	Make	Model	Capacity	Numbers
1	Shovels	Liebherr	R964C	5 M^3	1
	Shovels	Komatsu	PC 450	2.8 M^3	2
	Shovel	L&T	300CK	4.0 M^3	1
2	Rock Breaker	Atlas Copco		MB1200	1
3	Dumpers	BEML	Haul Pack	31.75 M.T.	2
	Dumpers	BEML	BH 35-2	31.75 M.T.	2
	Dumpers	HM	1035	31.75 M.T.	2
	Dumper	Caterpillar	770G	40.0 M.T.	3
4	Compressor	Atlas Copco	XAH-210	450CFM	1
5	Drill	Atlas Copco	BVB25	4 1/2"	1
6	Track Mounted Drill	Rewathi	CP60	6"/550CFM	1
7	Dozer	BEML	155		1
8	De-Watering Pumps	Kirloskar	Centrifugal	30HP	2
		Kirloskar	Centrifugal	40 HP	1
		Kirloskar	Centrifugal	50HP	1
		KSB	Submersible	40HP	1
9	Explosive Van	TATA	LPT 109 EX II	8T	1
10	Water Tanker	Ashok Leland	LPT1613	10KL	1
11	Mobile Service Van	TATA	EX-1613	7Persons	1

RAIN LIMESTONE, SHALE & CLAY MINE OF M/s RAIN CEMENTS LIMITED

Name & Location of the Mine : Rain Limestone, Shale & Clay Mine, Ramapuram.
Name of the Mineral : Limestone & Shale.
Name of the Owner : Sri. N. Sujith Kumar Reddy.
Name of the Agent : Sri. C. Balanagaiah.
Agent Phone Number : 08683 234605
Agent Mail ID : balanagaiah@priyacement.com
Name of the Manager : Sri. M. Srinivasa Reddy.
Manager Phone Number : +91 80085 56503
Manager Mail ID : srinivasareddy@priyacement.com
Postal Address : M/s Rain Cements Ltd.,
Ramapuram (Vi),
Mellacheruvu (Md),
Suryapet (Dist.) – 508 246.
Extent of Mining Lease in Hectares : 473.77 Hect.
Date of Opening of Mine : 11.01.1986.
Total Reserves as on 01.04.2018 : 168.86 Million tones.
Production during 2017-18 : 7,91,000 MT
Stripping Ratio : NIL
Powder Factor : 7.8 MT/Kg.
Productivity (OMS) : 77 MT
No. of Persons employed : 42
No. of Shifts operated : 2
Mine is operated by Mechanized/
Semi-Mechanized/Manual Method : Mechanized.

Brief description of Geology of Deposit :

The Limestone deposits in ML area are belongs to the Narji Limestone formation. Limestone outcrops are in the colour shades of Grey, Off-white and Green exhibit fine-grained texture, hard and compact in nature and have thin shale partings. The Limestone shows typical bedded nature with varying thickness. The various rock types in the area are well exposed in elevated places. The beds are observed to be dipping 5° to 25° due SE. The strike of the beds swings N 25° E – S 25° W in the North western part of the area to N 55° E - S-55° W in the southern part of the area.

Description of Machinery deployed

EQUIPMENT	MAKE	MODEL	CAPACITY	UNITS
Hydraulic Excavators (Shovel)	Tata Hitachi	Z-Axis 450H	2.8 m^3	1
Hydraulic Excavators (Back hoe)	Tata Hitachi	Z-Axis 450H	2.6 m^3	1
Dumpers	Hindustan	HM-1035	35 MT	4
Dozers	BEML	BD-155	320 HP	1
Compressor	Ingersoll Rand (IR)	HP 540	540 cfm	1
Drill	KLR	ITD 10	115 mm	1
Explosive Van	Devi Coach Builders	Tata 709 Ex Turbo	5 MT	1
Mobile Service Van	ELGI	Tata 709 Ex Turbo	5 MT	1
Water Tanker	Ashok Leyland	ALU 370	17 KL	1
Mobile Lighting Tower	Sigma Search Lights Ltd.	KG1-5AS	5 KVA	1
Vibro Compactor	Volvo	SD 110	11 MT	1

YEPALAMADHAVARAM LIMESTONE MINE
M/s. MY HOME INDUSTRIES PRIVATE LIMITED

MINE RESUME

Name & Location of the Mine	:	Yepalamadhavaram Limestone Mine
Name of the Mineral	:	Limestone
Name of the Owner	:	Chandrasekhar Pandey, Nominated Owner
Name of the Agent	:	Vijay Keshav Chakunde
Agent Phone Number	:	8096508090
Agent Mail ID	:	vijaychakunde@myhomegroup.in
Name of the Manager	:	N. Suryanarayana Raju
Manager Phone Number	:	8096508095
Manager Mail ID	:	nsnraju@myhomegroup.in
Postal Address	:	Srinagar, Mellacheruvu-508 246 Suryapet District, Telangana.
Extent of Mining Lease in Hectares	:	89.37 Hectares.
Date of Opening of Mine	:	02-12-2004
Total Reserves	:	Proved (111) : 28.091 Probable (122) : 7.960 Remaining Resource : 14.740 **Total 50.791**
Production during 2017-18	:	6,60,000 MT
Stripping Ratio	:	-Nil-
Powder Factor	:	8.18
Productivity (OMS)	:	48
No. of Persons employed	:	55
No. of Shifts operated	:	01
Mine is operated by Mechanized/ Semi-Mechanized/Manual Method	:	Mechanised
Brief description of Geology of Deposit	:	Annexure-II (Attached)
Special Achievements if any	:	Won overall 1st Prize in MS&PC-2017, 2016 2015, 2014 & 2013.'B' Group Mines consecutively.

Description of Machinery deployed :

S.No.	Equipment	Make	Model	Capacity	Numbers
1	Excavators	KOMASTU & TATA Hitachi	PC-300 & EX 200	2.0 & $0.9M^3$	01 01
2	Dump - Truck	Ashok Leyland	--	24 MT	10
3	Compressor	ELGI	PG 500-175	500 cfm	01
4	Wagon Drills	MRD	--	115 mm	01
5	Explosive Van	EICHER	2007	4.86 MT	01
6	Rock Breaker	Jisung	JSB 81A	135 HP	01
7	Water Tanker	Ashok Leyland	2518	10 KL	01

ANNEXURE - I

YEPALAMADHAVARAM LIMESTONE MINE
M/s. MY HOME INDUSTRIES LIMITED
Geology of the Deposit

The Geographical location of the Yepalamadhavaram Limestone Mine is 30 Kms from Kodad National Highway, N.H. 9 connecting Hyderabad – Vijayawada is passing through Kodad.

Its geographical co-ordinates are shown in the Survey of India, Topo Sheet No. 56P/13.

North Latitudes : 16° 47' 20"
16° 47' 50"
East Longitudes : 79° 55' 53"
79° 56' 46"

The area is located in north eastern margins of the Kadapa basin, called "Palnad sub-basin". The geological formation in the area comprises of a sequence of arenaceous, argillaceous and calcareous rocks belonging to the Kurnool group of Rocks.

Kurnool system of rocks is the youngest group of rocks in the Kadapa Basin. These youngest rocks are formed in the Palnad area stretching on both sides of the Krishna River, called as Palnad resting unconformably on the Cuddapah formation.

The limestone deposit within the mining lease hold area forms a part of Proterozoic Palnad basin equivalent of Narji Limestone formation of Kurnool group. These carbonate rocks or Narji limestone formations are sub-divided into several district lithological units.

↑ Soil cover
Grey Limestone
Green Limestone
Purple Shale

The general strike of the deposit is NNE-SSE to NE-SW trend with dip about 10° to 20° ESE/SE. Vertical Strike joints are common.

Quality of Limestone:

Total TCo_3 : 73 % – 80 %
SiO_2 : 14 % – 20 %

MINE RESUME

NAME AND LOCATION OF THE MINE	:	SAGAR CEMENTS LIMESTONE MINE-II PEDAVEEDU
NAME OF THE MINERAL	:	LIMESTONE
NAME OF THE OWNER	:	SRI. S. ANANDA REDDY
NAME OF THE AGENT	:	SRI. D.S.N.V.PRASAD
AGENT PHONE NUMBER	:	7997066111
AGENT MAIL ID	:	dsnvprasad@sagarcements.in
NAME OF THE MANAGER	:	SRI. V. YUGUNDAR REDDY
MANAGER PHONE NUMBER	:	7729971810
MANAGER MAIL ID	:	vyugandharreddy@sagarcements.in
POSTAL ADDRESS	:	MATTAMPALLY (MANDAL & VIL), SUTYAPET (DT) TELANGANA (STATE)-508 204
EXTENT OF MINING LEASE IN HECTORS	:	143.72
DATE OF OPENING OF MINE	:	24.06.1985
TOTAL RESERVES	:	37 MILLION TON
PRODUCTION DURING 2017	:	292000 TON
STRIPPING RATIO	:	NIL
POWDER FACTOR	:	7.14
PRODUCTIVITY (OMS)	:	39.72 TON
NO. OF PERSONS EMPLOYED	:	14-PERMANENT, 15-CONTRACT
NO. OF SHIFTS OPERATED	:	01 (GENERAL)
MINE IS OPERATED BY MECHANISED/ SEMI-MECHANISED/MANUAL METHOD	:	SEMI-MECHANISED

BRIEF DESCRIPTION OF GEOLOGY OF DEPOSIT :

The ML area falls in the part of Palnad sub Basin with in the Cuddapah Basin belongs to Nirji formation of Jammalamadugu series of Kurnool group. Thetopography of the area is gently undulating.There is seasonal stream iflowing almost parallel to the strike of the beds i.e. NE - SW direction. The mining lease area is located in between the north latitudes of $16^0 44'40''$ and $16^0 44'00''$ and East latitudes of $79^0 49'30''$ and $79^0 50'55''$ falling under survey of India Topo sheet No: 56P/13 &14 on :50000 Scale. The Major Litho units of the area are purple, green, and dark grey Lime stone out crops have been Traced. Limestone beds are massive in general and showing a NE - SW trend., dipping due South East at shallow angles of (2^0 to 6^0).

SPECIAL ACHIEVEMENTS IF ANY :

DESCRIPTION OF MACHINERY DEPLOYED :

S. No	Equipment	Make	Model	Capacity	Numbers
1	BACK HOE	TATA	EX – 200 LC	0.9 m^3	1
2	COMPRESSOR	ATLAS COPCO	XAH – 210	445 cfm	1
3	DRILL MACHINE	ATLAS COPCO	BVB 25/10	115 mm dia	1
4	TIPPERS	BHARAT BENZ	2528C	20 MT	5
5	WATER TANKER	ASHOK LEYLAND	1616 IL	12 KL	1

Greygold Cements Limestone Mine
Of
M/s. Greygold Cements Limited

MINE'S RESUME

Name and location of the mine : Greygold Cements Limestone Mine,

Name of the Mineral : Limestone

Name of the owner : M/s. Greygold cements limited

Name of the agent : Sri.M.Srinivas Reddy

Agent phone no. : 9866896834

Agent mail ID : works@greygoldcements.com

Name of the manager : Sri E.Upendra Chary

Manager phone no. : 7013453909

Manager mail ID : mines@greygoldcements.com

Postal address of the mine : Mattampally (V&M), Suryapet Dist. T.S.

Extent of mining lease : 121.45 Ha.

Date of opening of the mine : 1994

Total reserves : 30.00 Million Tones

Production 2017-2018 : 89700 MTs

Stripping Ratio : Nil

Productivity OMS : 21.00 MTS

No of persons employed (opencast) : 13 No's

No of persons employed (above ground) : 01 No.

No of shift operated : General Shift Only

Mine is operated by Mechanized / Semi – Mechanized / Manual method : Semi mechanized mining

Special Achievements if any : Well Plantation

Brief description of Geology of Deposit : The bedding strike direction is from E-W or NNE – SSW with dips of 5^0 to 20^0 towards S or SE Direction.

Description of Machinery deployed

S.No	Equipment	Make	Model	Capacity	Numbers
1.	Loading	TATA HITACHI	EX 110	0.7 Cub mtr	1
2.	Tippers	ASHOK LEYLAND	COMET	10 tonnes	3
3.	Compressor	CHICAGO PNEUMATIC	CP 450	10 Kgf / Cm^2	1
4.	Rock Breaker	JISUNG	JSB 50 S	861 Kgs	1
5.	Wagon Drill	Atlas Capco		100 mm Ø	1

SRI SANKARA LIMESTONE MINE OF M/s. KEERTHI INDUSTRIES LIMITED

Name of the Mine : Sri Sankara Limestone Mine

Name of the Mineral : Limestone

Name of the Owner : Sri Er. J.S. Rao, Managing Director
Name of the Agent : Sri M. Vasantha Kumar

Agent Phone Number : 08683-226039 / 34.

Name of the Mines Manager : Sri D. Jwannes Reddy

Manager phone Number : +91 9553302379

Manager Mail ID : **mines@keerthiindustries.com**

Postal Address : Mellacheruvu (Post & Vill), Suryapet (Dist.), Telangana – 508246.

Date of Opening : 06.06.1986.

Total M.L. Area : 350.000 Acres.

Total Reserves

Proved (111)	28,35,430 Tons
Probable (122)	34,42,200 Tons
Remaining Resources	6,76,73,822 Tons
Total	**7,39,51,452 Tons**

Production during 2017-18 : 5,94,636 MT

Stripping Ratio : Nil.

Powder Factor : 5 (MT / Kg)

Productivity (OMS) : 69

Number of Persons Employed : 22

No Shifts Operated : 02

Mine is operated : Mechanized Mine

BRIEF NOTE ON GEOLOGY:

The Geographical Location of the Sri Sankara Limestone mine is situated at 1.50 Km due South of Mellacheruvu Village and Mandal Head Quarters of Suryapet District (formerly Nalgonda District), Telangana state.

Its geographical Co-Ordinates are shown in the Survey of India Topo Sheet No. 56P/13.

North Latitude : 16°47'57.9"
East Longitude : 79°54'54.2"

Lime Stone occurring in this Area are belongs to the "Narji Formation" of "Jammalamadugu series" of Kurnool System. The area forms a part of the "Palnad sub-basin" of Proterozoic age, within the 'Cuddapah Basin 'of Upper pre-Cambrian age. The Lime stone shows the beds are either horizontal or gently dipping, essentially towards SE @ 2^0 to 5^0 with general bedding strike in NE-SW.

Lithology:

Litho units encountered in the subject area are		Narji Formation
1	Soil (mostly as a creep in joints)	Kurnool Group of "Kadapa Super Group"
2	Grey Limestone (G.L.)	
3	Green Limestone (G.N.L.)	
4	Siliceous Limestone (S.L)	

Quality of Limestone:

Total TCo_3 : 80% - 88%
SiO_2 : 7% - 13%

List of Machinery:

S. No	Equipment	Make	Model	Capacity	No
1	Hydraulic Excavator	TATA	ZAXIS 370	1.2 M^3	01
2	Hydraulic Excavator	TATA	EX 200LC	0.9 M^3	02
3	Rock Breaker	DAEMO	DMB – 210	80 Tons / Hr	01
4	Diesel Compressor	Atlas Capco	XAV 216	450 CFM	01
5	Electrical Compressor	Atlas Capco	GAE 90	422 CFM	01
6	Drill Machine (Track Mounted)	Atlas Capco	ROC – 203	115 MM	01
7	Drill Machine (Tyre Mounted)	Atlas Capco	BVB - 25	115 MM	01
8	Dewatering Pump	Kirloskar	50 H.P	150 M^3 / Hr	01
9	Dewatering Pump	Kirloskar	30 H.P	100 M^3 / Hr	01
10	Tippers	Ashok Leyland	2516	25 Tons	05
11	Tippers	Ashok Leyland	2214	25 Tons	04
12	Mobile Lighting Tower	Techno Towers	TTL-02 TMLT	5 KVA	01

MINE RESUME

DEVAPUR LIMESTONE MINE OF M/S TELANGANA STATE MINERAL DEVELOPMENT CORPORATION LIMITED (ORIENT CEMENT LTD)

Name & Location of the Mine	:	**Devapur Limestone Mine of M/s TSMDC LTD Devapur Cement Works (Post) Devapur - 504218 Kasipet (M) Mancherial (Dist.) Telangana State**
Name of the Mineral	:	**Limestone**
Name of the Owner	:	**Shri G Malsur M/s TSMDC Ltd.**
Name of the Agent	:	**Shri K Rajasekhar Reddy**
Agent Phone Number	:	**9490167234**
Agent Mail ID	:	**tsmdcltd.devapur@gmail.com**
Name of the Manager	:	**Shri KRajasekhar Reddy**
Manager Phone Number	:	**9490167234**
Manager Mail ID	:	**tsmdcltd.devapur@gmail.com**
Postal Address	:	**Devapur Limestone Mine of M/s TSMDC LTD (Telangana Unit) Devapur Cement Works (Post) Devapur - 504218 Kasipet (M) Mancherial (Dist.) Telangana State**
Extent of Mining Lease in Hectares	:	**210 Hectares**
Date of Opening of Mine	:	**14th November 1981**
Total Reserves	:	**21.51 Million Tones**
Production during 2017-2018	:	**40.18 Lac MT**
Stripping Ratio (LS : OB)	:	**1: 0.27**
Powder Factor	:	**9.1**
Productivity (OMS)	:	**95 MT / Man / Shift**
No. of Persons employed	:	**242**
No. of Shifts operated	:	**3**
Mine is operated by Mechanized/Semi-Mechanized/Manual Method	:	**Mechanized**

Brief description of Geology of Deposit:

Devapur Limestone Mine of M/s Andhra Pradesh Mineral Development Corporation Limited (now TSMDC Ltd) supplying limestone for the 3.50 million tonnes capacity Cement Plant of M/s Orient Cement. This Mine is situated in Devapur village of Kasipet Mandal of Adilabad District. The present Mining lease is of 210.0 hectares

ReservedForest, which was deforested with the permission of Forest Department and MOEF. The area falls under survey of India toposheet number 56.M/8 and is between northern latitudes 19°01'04" & 19°02'10" and eastern longitudes 79°19'34" & 79°20'25".

The limestone belongs to upper limestone formation of Penganga group, which is of lower vindhyan age. The limestone is both underlain and overlain by shale's and is of 3 distinct varieties. The general strike varies between N40°W-S40°E and N45°W-S45°E. The general dip is about 6° towards S40°-50°W.

Special Achievements if any :

In the year 2017-18, we have achieved Limestone production of 40.18 Lac MT and Overburden of 9.18 Lac MT without any accident.

Description of Machinery deployed :

S.No.	Equipment	Make	Model	Capacity	Numbers
1	Hyd. Excavators	TATA HITACHI	350LC	1.9 cu.m	02
2	Hyd. Excavators	KOBELCO	380SK	2.0 cu.m	04
3	Hyd. Rock Breaker	(FINE ROCK BREAKER) & KOBELCO (EXCAVATOR)	380SK	300 bpm	01
4	Vibro Ripper	HOUTEC(RIPPER) & KOBELCO(EXCAVATOR)	DBL650 380SK	30 MT	01
5	Tippers	ASHOK LEYLAND	U 2523	17MT	16
6	Tippers	AMW	TP 2523	17MT	09
7	Drills	HRB	HRB 150 RX	600CFM	01
8	Drills	CP REVATHI	C60H-6”	550CFM	01
09	Drills	ATLAS CAPCO	D35-4”	450CFM	01
10	Dozer	BEML	BD155A	324HP	01
11	Wheel Loader	H M	2021	2.3 cu.m	01
12	Wheel Loader	JCB	432ZX	1.8 cu.m	01
13	Compactor	L & T	1107D	---	01
14	Water Tanker	ASHOK LEYLAND	1613	12 KL	02
15	Explosive Van	TATA	1109EX	6.6MT	01
16	Explosive Van	TATA	407	3MT	01
17	Maintenance Van	EICHER	LTP1109	---	01

KESORAM CEMENT

BASANTNAGAR LIMESTONE MINES INFORMATION CHART

1. Name of the Mine	:	**BASANTHNAGAR LIMESTONE MINE**
2. Name of the Mineral Extracted	:	**LIMESTONE**
3. Name of the Owner	:	**Syt. C.K.JAIN**
4. Name of the Agent	:	**Shri. RAJESH GARG**
5. Name of the Mine Manager	:	**Shri. M.RAVINDAR REDDY**
6. Location and Address	:	**Basantnagar –Village, Palakurty-Mandal, Peddapalli -Dist, T.S. Pin: 505 187**
7. Total Mining Lease area	:	**360.26 Ha**
8. ML area valid up to	:	**31.08.2030**
9. Total Reserves	:	**19.50 Millions**
10. Present Annual Output	:	**1.00 Million Tonnes**
11. Stripping Ratio	:	**1:2.50**
12. Powder Factor	:	**9.00 TON/Kg**
13. No. of persons employed in the mine	:	**81**
14. No. of shifts operated	:	**Two shifts**

15. Mine is Operated by mechanised/
Semi-mechanised/ Manual method : **Mechanized Opencast**

16. **Brief note on difficulties/ special Prevailing in Mines:**

Limestone deposit of Basantnagr Limestone Mines is a complex deposit having three almost parallel

Bands. Strike length of the bands is approx. 7 Kms whereas width is varying of 30 – 60 meters. Limestone bands are intensely folded at places and also having number of minor faults. Bands are dipping from 30^0 to 70^0 and are capped with siliceous limestone at hanging wall side. Average striping ratio is approx. 1:2.50

Because of quality variations and minor faults deposit is divided into number of blocks. To get optimum cement grade limestone proper blending of limestone at different blocks is required. Due to complex geological formation the major problem in day-to-day Mining operations.

- Staggered working requires high degree of supervision and more M/c & Manpower.
- Maintenance of bench width and haul road is difficult
- More haul distance and road gradient
- Intensive fault and fractured zone
- Intensely folds cause uneven bench floor and faces.
- More area is required for waste rock dumping and stabilization of dump yard

Despite of these difficulties Kesoram cement is maintaining mines in very good, neat and clean, safe & tidy condition. Permanent haul road is cement concrete road, maintained clean with the help of road sweeping m/c (vacuum cleaner), mine pit roads are maintained with the help of compactor and dozer combination. Eco friendly rock breaker is being used to deal with boulder and toe formation. Back filling is being done regularly from foot wall side where ever the pit has reached to its ultimate depth. Massive plantation has been done all along the sides of haul road, back filled area, stablised dump yard and non mineralized area wherever available. Two beautiful picnic spot are developed over back filled area and stablilised dump yards. To maintain accurate road gradient, bench width and height Sokkia-Total station instrument is being used. To avoid manual mixing of Ammonium Nitrate with Diesel, we have procured BMD unit, which can mix uniform mixing of Ammonium Nitrate with fuel based on pre-setting of A.N & Diesel ratio and discharging of ANFO and fuel oil ratio can be controlled from the control panel. On Introduction of this BMD unit, we could take big Blasts and blasting performance also very good. This reduces the no. of Blasts and avoids secondary blasting. This Machine is eco-friendly Machine.

MINING MACHINERY

SL No	Type of machinery	Capacity of each unit	No. of	H.P
1	L & T 300 CK Shovel	2.70 - 3.70 M^3	07	335 H.P
2	L & T 90 CK Shovel with rock breaker	1.0 M^3	01	106 H.P
3	BEML Dozer D155	---	03	320 H.P
4	BEML Dumpers	35 Tonnes	19	380 H.P
5	Terex Loaders	5.0 M^3	02	450 H.P
6	IBH-10 Drill	540 cfm	04	280 HP
7	Atlas compressor(XAH 210)	450cfm	01	180 HP
8	Explosive Van	7 Tonnes	02	66 HP
9	Mahindra & Mahindra (Arjun Tractor)		03	50 HP
10	Voltas & Godrej Fork lift	-	02	40 HP
11	Water Tanker TATA 1210E	-	01	110 HP
12	Water Tanker TATA 1613		01	120 HP
13	Field Maintenance Truck	-	02	66 HP
14	Diesel Tanker	-	01	66 HP
15	B.M.D. Unit	-	01	132 HP
16	Road Sweeping Machine	-	01	-
17	Bus	-	01	-
18	Jeep	-	04	-

Technical information of

MADHARAM DOLOMITE MINE

Name of the Mine	: Madharam Dolomite Mine
Name of the Mineral	: Dolomite
Name of the Owner	: Sri P K Rath, Director(Operations)
Name of the Agent	: Sri D Sivakumar DGM(Mines)
Name of the Manager	: Sri P Kiran kumar, AGM(Mines)
Location Address	: Maadharam:Post, Singareni: Mandal Khammam: Dist.: TG
Total Mining Lease Area	: 950 Acres
ML Valid up to	: 01.07.2020
Total Reserves	: 53 Million tons
Annual output	: 5.40 Lakh tonnes per year
Powder factor	: 3.5 tons / kg
Productivity (OMS)	: 11.14 tons
No.of persons employed in mine: 166	
No.of shifts operated	: 4 (A,B,C & General)
Mine is operation	: Fully Mechanised

List of mining Equipment:

Sl.No	Description of Equipment **HEMM**	Eqpt.No.s
01	PC-800, Komatsu made Hyd.Excavator	02
02	PC-700 BEML Make	01
03	300CKL &T make Hydraulic Excavator	01
04	Loader, Hindustan Make 2021	02
05	Haulpak Dumpers 35 tons	03
06	Dumper Hindusthan Made-35 ton	03
07	100mm dia, crawler mounted, DTH Drills, Atlas Copco/RECP	03
08	10.3 cum portable diesel compressors	02
09	Bull dozer cater pillar make 320HP	01
10	Bull dozer BEML make D-355	01
11	Compressor,ELGI(450/150	01
12	Escorts mobile crane 8 tonnes C-800	01
13	L&T make Rock breaker	01
14	JCB make Rock breaker	01
LIGHT VEHICLES		
01	Explosive Van 10T cap:TATA make	01
02	ELGI Mobile Maintenance Van TATA Make	01
03	Diesel Generator -380 KVBA	01
04	Cargo Mini Truck TATA make	01
05	Cargo mini truck diesel browser TATA make	01
06	10 t Truck – Ashok Leyland Make	01

Brief note on Geology:

The dolomite deposits occur in a plain country with minor undulations. The dolomite deposit occur in the form of bands and extends in the areas adjacent to Mukundapuram, Chennagalagaddem, Kothathanda, Madharam and Govinda Thanda villages.

The rock types in the area belong mostly to the Archean with bands of the Pakhal sediments. The contact between the Archean and Pakhal is charecterized by conglomerate bed. The Archean consist of Phyllites and Granite exposed in the eastern part of the area. Palkhals comprise of conglomerate, grit, shale and dolomite.

The dolomite bands extend along the north-south direction for a length of about 6kms with variable width. The length of the southern band is about 2.5kms

The dolomite is gray colour, hard compact, massive and fine grained. In the western side laterite and lateritic soil are found to occur as capping over dolomite.

The reserve of Dolomite in southern lens have been estimated at about 41 million tons up to a depth of 30 metres of the total reserves about 38 million tons ore of the SMS grade and about 3 Million tons of BF grade. The average grade of dolomite is computed at CaO – 30.5%, MgO – 21.2% and SiO_2 – 0.9%. a mining lease of 950 acres has been granted. The average width of deposit varies from 80 to 400metres. The general dip is 20 -65 east or south east.

Miscellaneous information if any : Nil

MINE RESUME

1. Name & Location of the Mine : Jayanthipuram Limestone Mine
2. Name of the Mineral : Limestone
3. Name of the Owner : M/s. The Ramco Cements Limited
4. Name of the Agent : Sri P. Jani Reddy
5. Agent Phone Number : 9000504383
6. Agent Mail ID : pjr@ramcocements.co.in
7. Name of the Manager : Sri S. Venkateswara Reddy
8. Manager Phone Number : 9000504372
9. Manager Mail ID : svr@ramcocements.co.in
10. Postal Address : K.S.R Nagar – 521 457, Jaggayyapet-Mandal, Krishna-District, Andhra Pradesh-State.
11. Extent of Mining Lease : 344.89 Ha
12. Date of Opening of the Mine : 12.05.1986
13. Total Reserves as on 01.01.2018: 74.50 Million Tones
14. Production (2017) : 15,31,944 MT
15. Stripping Ratio : 1 : 0.23
16. Productivity (OMS) : 64.08 MT
17. No. of Persons employed : 73 Nos
18. No. of Shifts operated : Two
19. Mine is operated by : Mechanized
20. Special Achievements if any : Obtained Overall 1st Prize in 2017, 2015, 2013 & 2010, Overall 2nd Prize in 2016, 2014, 2012 & 2011
21. Brief description of Geology of Deposit : The deposit located near Jayanthipuram Village of Nargi Limestone Formation belonging to Kurnool System. The general strike of the limestone bands is N61°W-S61°E. The beds are dipping in southern direction with a dip amount varying from 6° to18 °. In the eastern side of the deposit towards the contact of Phylite, beds having steep dips are encountered. The limestone exposures are bounded on the northeast by underlying shale whereas in the southwest by the overlying Phylite.

Description of Machinery deployed :

S.No.	Equipment	Make	Model	Capacity	Numbers
1	Excavators	KOMATSU	PC-300	1.80 Cu.m	2
3	Tippers	LEYLAND	2523	20 MT	12
4	Wagon Drill	ATLAS COPCO	BVB 25	30 mtrs	2
5	Dozer	BEML	D 155A	320 HP	1
6	Compressor	ELGI	DS 475-150	445 Cfm	2
7	Mobile Service van	TATA	1612		1
8	Water Tanker	TATA	1612	10 K.L	1
9	Explosives Van	TATA	1213	9.64 MT	1

MINE RESUME

1. Name & Location of the Mine : Ravirala Limestone Mine
2. Name of the Mineral : Limestone
3. Name of the Owner : M/s. The Ramco Cements Limited
4. Name of the Agent : Sri P. Jani Reddy
5. Agent Phone Number : 9000504383
6. Agent Mail ID : pjr@ramcocements.co.in
7. Name of the Manager : Sri P. Vidya Kiran
8. Manager Phone Number : 9652865435
9. Manager Mail ID : vidyakiran@ramcocements.co.in
10. Postal Address : K.S.R Nagar – 521 457
11. Extent of Mining Lease in Hectares : 60.72 Ha
12. Date of Opening of Mine : 03.04.2006
13. Total Reservesas on 01.01.2018 : 23.07 Million Tones :
14. Production (2017) : 4,34,589 MT
15. Stripping Ratio : 1 : 0.60
16. Productivity (OMS) : 50.83 MT
17. No. of Persons employed : 43 Nos
18. No. of Shifts operated : Two
19. Mine is operated by : Mechanized
20. Special Achievements if any : Obtained Overall 1st Prize in 2011, Overall 2nd Prize in 2010 & Overall 3rd Prize in 2013
21. Brief description of Geology of Deposit : The deposit located in the Jaggayyapet extension Reserve forest of Ravirala Village forms a part of Nargi Limestone Formation belonging to Kurnool System. Limestone constitutes the elevated portion, as a result of weathering, erosion and structural disturbances. The limestone dips at an angle of about 5^{o} to 20^{o} in a South east direction. The limestone is traced over a strike length of about 1.86km with the width ranging from 330 to 160 m in the area. It is covered by the Cumbum Phylite further south. It is of medium grey colour, fine grained compact and tough.

Description of Machinery deployed :

S.No.	Equipment	Make	Model	Capacity	Numbers
1	Excavators	L&T Komatsu	PC-300	2.1 Cu.m	2
2	Tippers	Man -FORCE	MAN -S -280	20 MT	10
3	Wagon Drill	Atlas copco	BVB 25	30 mtrs	1
4	Dozer	SNATUI		220 HP	1
5	Compressor	ELGI	I450	445 Cfm	1
6	Water Tanker	AMW		10 K.L	1
7	Explosives Van	TATA	607	2.25 MT	1

MUKTYALA LIMESTONE MINE

Of M/s. The KCP Limited, Cement Unit – II,
Muktyala (Village), Jaggayyapet (MD), Krishna (Dist.)

MINE RESUME

Name & Location of the Mine	:	**MUKTYALA LIMESTONE MINE & Latitude of N 16^0 49'45" to N 16^0 51' 00" & Longitude of E 80^0 03' 15" to E 80^0 05' 15"**
Name of the Mineral	:	**Limestone**
Name of the Owner	:	**Dr. V.L. Dutt,**
Name of the Agent	:	**Dr. GVK Prasad**
Agent Phone Number	:	**08654 - 296006 / 7 / 8**
Agent Mail ID	:	**gvk@kcp.co.in**
Name of the Manager	:	**Sri. B. Anil Kumar**
Manager Phone Number	:	**9491296071**
Manager Mail ID	:	**mines.rkpuram@kcp.co.in**
Postal Address of the Mine	:	**Ramakrishnapuram, Muktyala (V), Jaggayyapeta (M), Krishna (Dist.), Andhra Pradesh - 521457. Telephone No: 08654- 296006/7/8**
Extent of Mining Lease in Hectares	:	**368.35 Ha (910.19 Ac)**
Date of Opening of Mine	:	**10 -08 - 2007**
Total Reserves	:	**174.2 Million Tonnes**
Production during - 2017 to 2018	:	**19,55,000 MT**
Stripping Ratio	:	**Negligible**
Powder Factor	:	**8.2**
Productivity (OMS)	:	**99.34**
No. of Persons employed	:	**55 no's**
No. of Shifts operated	:	**General Shift (8:00 AM to 5:30 PM)**
Mine is operated by mechanized/ Semi-Mechanized/Manual Method	:	**"A" Grade - Fully Mechanised Mine**
Brief description of Geology of Deposit	:	

Geology of ML area:

Regional Geology: The area forms a part of the Palnad sub-basin comprising Precambrian, Proterozoic strata. Litho units belonging to the Kurnool Group and co-relatable to Narji Limestone formation occur in and around the area. The Limestone formation has an estimated thickness of about 100m in the Palnad basin but not all of it is useable as raw material for cement manufacturing. The carbonate rocks do manifest Litho-facies variations both along and across the strike. This variation in the regional general stratigraphic succession is as follows.

Series & Stage		Rocks & Lithology
Paniam	-	Quartzite
Jammalamadugu	-	1) Auk Shales 2) Narji Limestone
Banganpalli	-	Quartzite Sandstones
-----------------------------------	Thrust Contact	-----------------------------
Cuddapah	-	Quartzite/ Phyllites

Local Geology: The area under consideration forms part of Palnad Basin which in turn makes up the part of the rocks of Kurnool group occur in the Muktyala area. The two main lithological viz. calcareous, limestone and shale occur as discrete inter bedded bands especially in the eastern half

The different bands of limestone may represent synclinal kneels of a single folded unit, the anticline hinges have been eroded off exposing in their place the underlying calcareous shale. The Calcareous shale is dirty grey to Khaki coloured. In the eastern part the shale is more intensely weathered and are variegated in coloured. In the western Part west of the shale is highly fissile with the developments of cleavage. The limestone is hard, massive and fine grained with dark colour predominating over the light gray, pink and creamy white. The lighter colours are more prominent in the eastern part. The light pink and creamy white bands of limestone occur inter bedded with light variety, especially towards the strategic top of the limestone unit. Outcrops are profusely present in the area which exhibits ribbed weathering formation of circular pits etc. which are the manifestations of good quality Limestone.

Vein quartz of 1 to 1.5 m wide zones occurs at regular intervals in calcareous shale in the eastern part. The areas underlain by such veins are characterized by the presence of quartz rubble on the surface. In the western part thin veins of quartz are present in limestone. Where the limestone outcrops are less intense greyish brown, gray or black cotton soil is present those areas whereas in the shale bearing areas brownish red soil is very common.

The strike of bedding in general is **NNE-SSW** with 35^0 easterly dips. Cleavage becomes more prominent in the western and central part in gray shale. Limestone occurs as discrete bands and as a big patch intercepted with bands of calcareous shale, the eastern part of the lease is made up of four discrete alternating with shale. The limestone bands have a distinct **NNE- SSW** strike in the eastern block with low dips, the dimensions of these bands range from 620m to 2160m in length and 100m to 350m in width.

The limestone band in NW part is the most prominent on and extends for 1800 m in E- W direction with an average width of 280m. It is approximately in triangular shape stretched in westerly direction and tapers in the same direction. All the limestone bands display expellants exposures with sporadic black cotton soil patches amidst the outcrops.

Between the limestone bands calcareous shale (Shale limestone) material is accumulated. In general the limestone is dark to steel gray in colour with fine grained texture. Thin pink purple and creamy white limestone bands Impersistent along strike occur in the band-1 of the eastern block.

Special Achievements if any : **Zero incidents in Mine Operation.**

KCP Limestone Deposit-II Mine
of M/s The KCP Limited, Macherla.

1. Name of the Mine	: KCP Limestone Deposit-II Mine.
2. Name of the company	: M/s The KCP Limited,
Postal Address of the Mine	No.2 Dr P.V. Cherian Crescent
	Egmore, Chennai.
3. Name of the owner	: Dr V.L. Dutt.
4. Name of the Agent	: Sri B.V.P.S. Chowdary
5. Name of the Manager	: Sri V. Venkata Ramana.
6. Mineral Worked	: Limestone.
7. Number of Mining leases	: Single.
8. Extent of Mining Lease	: 20.046 Ha.
9. Date of opening of the Mine	: 05.07.2016.
10. Mineral Production	:
2016-17	:1,25,000Tonne
2017-18	: 4,10,000 Tonne
2018-19	: 2,57,990 (up to Oct-2018)
11. over burden handling	:
2016-17	: 9,000 CuM
2017-18	: 10,000 CuM
2018-19	: 5,000 CuM
12 Deployments of Mining Machineries	:
Details of Excavators/loaders	: Komatsu PC-300
Capacity in M3	: 1.7 CuM.
Numbers	: 02.
13. Dumpers/Tipper	: MAN TIPPER
Capacity in Metric Tonne	: 17
Numbers	: 05.
14. Drills	:
Capacity hole size	:4 ½ (115mm)
15 Water tankers	: Ashok Leyland.
Capacity	:09 KL

The Mine is fully mechanized opencast mine. Deep hole drilling with DTH holes by 115 mm diameter and the same has been blasted with Slurry and ANFO with Non-el Excel shock tubes. The blasted material loading with Komatsu PC-300 Excavators and transported by 17 MT dumpers to Crusher point. The benches are made 7.5 meters height and the width is 3 times to the height of the benches. The mines formation with 3 benches. First bench with overburden and other 2 benches are Limestone. The Overburden removed is being is used for reclamation / Backfilling in mined out areas.

Automatic water sprinklers are arranged along the haul roads up to the crusher point to avoid the dust generation during running of dumpers. DrillsMachines are fitted with water inject system and also water tanker 12 KL to avoid the dust generation on haul roads.

LIST OF MACHINERY

S.NO	TYPE OF MACHINARY	CAPACITY OF EACH UNIT	NO. OF UNITS	HP OF EACH UNIT	ELECTRICAL/ NON-ELECTRICAL
1	L&T Komatsu PC 300 LC Backhoe.	1.7 Cubic Mtrs.	1	128	Diesel
2	Komatsu PC 200 LC attached with Rock Breaker	0.9 Cubic Mtrs	1	100	Diesel
3	Tippers	17 Tonnes	5	1600	Diesel
4	Loader	1.8 Cubic Mt	1	110	Diesel
5	Atlas Copco Wagon with LM-100 Drill .	115 MM Dia	1	----	------
5	I. R. Compressor	450 CFM	1	180	Diesel
6	Water Tanker	9 K.L	1	110	Diesel
7	Explosive Van	2.5 Tonnes	1	110	Diesel
8	Tractor	-----	1	53	Diesel
9	Service van	-----	1	110	Diesel

Terala Limestone Mine
of M/s The KCP Limited, Macherla.

1. Name of the Mine	: Terala Limestone Mine.
2. Name of the company	: M/s The KCP Limited,
Postal Address of the Mine	No.2 Dr P.V. Cherian Crescent
	Egmore, Chennai.
3. Name of the owner	: Dr V.L. Dutt.
4. Name of the Agent	: Sri S.B.V.P.S.Chowdary.
5. Name of the Manager	: Sri S.Prasad.
6. Mineral Worked	: Limestone.
7. Number of Mining leases	: Single.
8. Extent of Mining Lease	: 49.18 Ha.
9. Date of opening of the Mine	: 08.12.2009.
10. Mineral Production	:
2012 -13	: 2,45,000 MT.
2013 -14	: 2,87,000 MT.
2014 -15	: 2,40,000 MT
2015-16	: 3,00,000 MT
2016-17	: 2,24,000 MT
2017-18	: 4,00,000 MT
2018-19	: 2,44,000 MT
11.Overburden	:
2015-16	:2370 MT
12. Deployment of Mining Machineries	:
Details of Excavators/loaders	: L&T Komatsu PC-300.
Capacity in M3	: 1.7 M3.
Numbers	: 01.
13. Dumpers/ Tippers	: Tippers (MAN)
Capacity in Metric Tonne	: 17.
Numbers	: 04.
14. Drills	:
Capacity hole size	: 4 ½ (115mm)
15 Dozer	: L&T Komatsu (D70-LE)
Capacity	:180 HP.
Numbers	: 1 No.

Geology: - The deposit is sedimentary type and it has got sand stone footwall and shale is hanging wall. The strike direction is NE – SW direction and dipping towards south west. The angle of dip is 2 to 6 degrees. The grade of limestone is easily identified by its colour dark grey/ light grey is high grade, green & pink colour is low grade. Order of superimposition is dark grey/light grey, green and pink limestone.

Method of Mining: - The Mine is mechanized opencast mine. Deephole drilling with DTH holes by 115 mm diameter and the same has been blasted with Slurry and ANFO with Non-el Excel shock tubes. The blasted material loading with L& T Komatsu PC -300 Excavators and transported by 17 MT tippers from mines to Crusher point. Drilling Machines are fitted with water inject system and also 12 KL water tanker is used for water sprinkling on haul roads to avoid the dust generation during hauling equipment are plying on the haul roads.

TERALA LIMESTONE MINE OF
M/s THE K C P LIMITED.
LIST OF MACHINERY

S.NO	TYPE OF MACHINARY	CAPACITY OF EACH UNIT	NO. OF UNITS	HP OF EACH UNIT	ELECTRICAL/ NON-ELECTRICAL
1	L&E Komatsu PC 300 LC Backhoe.	1.7 Cubic Mtrs.	1	128	Diesel
2	Tippers	17 Tonnes	5	1600	Diesel
3	Atlas Copco Wagon Drill BVB 25-10.	115 MM Dia 115 MM Dia	1 1	---- ----	------ ------
4	I. R. Compressor	450 CFM	1	180	Diesel
5	DOZER Komatsu D 70 LE		1	180	Diesel
6	Water Tanker	9 K.L	1	110	Diesel

Resume

Jaggayyapeta Limestone Mine, Jaggayyapeta, RINL/VSP

01.	**Name of Mine**	:	Jaggayyapeta Limestone Mine Jaggayyapeta
02.	**Name of the Owner**	:	Sri. Pradosh Kumar Rath Director (Operations), Rashriya Ispat Nigam Ltd. Visakhapatnam-530 031
03.	**Name of Agent**	:	**Sri Shiv Prasad, AGM(Mines), I/C**
04.	**Name of Mines Manager**	:	**Sri Vijay Kumar,AGM(Mines)**
05.	**Name of the Mineral**	:	**Limestone**
06.	**Agent phone Number**	:	**08654-200017**
07.	**Agent Mail ID**	:	**vspjlm@yahoo.co.in**
07.	**Postal Address**	:	**Jaggayyapeta Limestone Mine, Visakhapatnam Steel Plant, Budawada Village,Jaggayyapeta, Krishna District, Andhra Pradesh.**
08.	**Extent of mine lease in Hectares**	:	**1295 Hectares**
09.	**Date of Opening of Mine**	:	**14/06/1989**
10.	**Total Reserves**	:	**31.76 Million Tonnes(Due for updation by recent exploration)**
11.	**Production during 2017**	:	**3, 47, 000T**
12.	**Stripping Ratio**	:	**NIL**
13.	**Powder Factor**	:	**4.00**
14.	**Productivity**	:	**12.6**
15.	**No. of persons**	:	**92**
16.	**No. of Shifts Operated**	:	**2**
17.	**Mine is operated by Mechanized /Semi-Mechanized/Manual Method**	:	**Mechanized**
18.	**Description of Machinery Deployed**	:	

S.No	Equipment	Make	Model	Capacity	Numbers
1	SHOVEL	KOMATSU	PC 800	4.5cumm	1
2	SHOVEL	L&T	CK 300	3.2cumm	1
3	SHOVEL	BEML	BE-700	4.5cumm	1
4	DUMPER	BEML	BH 35-2	35Ton	4
5	DUMPER(converted To water tanker)	HM	1035	35Ton	1
6	DRILL	Revathi make	C-60H	100mmdia	1
7	DRILL	Atlas Copco	IBH 10	100mmdia	1
8	Rock Breaker	JCB	JS205		1
9	Front end Loader	DOOSAN	MEGA 500V	4.8cumm	1
10	DOZER	SHANTUI	SD-32	360HP	1

Geology

The litho logical units of Jaggayyapeta and adjacent areas comprise limestone, shales , quartzite and phylite which belong to the Precambrian sedimentary formations which constitute the north eastern part of the Palnad basin. They are flanked in the west, north and east by the granite gneiss of Archean age.

The rock types met within the area are shale overlain by limestone with an intermediate transition comprising argillaceous limestone and calcareous argillites. The shale and limestone are described below separately.

Shale: The shale, in general, are purple in color, well laminated, fragile chlorite and with quartz calcite veins at places is discernible. The transitional zone of shale and limestone is conspicuous with profuse quartz calcite veins.

Limestone: Limestone overlies the shale and is predominantly grey in color but shades of white, yellow, buff, purple and green are not uncommon. Argillaceous partings, quartz and calcite veins are present at places with a higher frequency in the basal part. The rock is generally massive, hard, compact and breakes with conchoidal fracture. The upper part of the limestone is thinly bedded and flaggy. The limestone is generally micro-crystalline with granulose texture and essentially composed of calcite with minor amounts of quartz clayey matter, chloritic and sericite.

The general trend of limestone in the north block is E-W with minor rolls along the strike and dip. The overall inclination of beds is about 5^0 to 25^0 towards south. In the south block, the general trend of rocks is N-S with gentle rolling dip of about 2° to 25° towards east. The cleavage observed in fair places dips in the same direction as the bedding. Four sets of vertical to slightly dipping joints have been recorded. They are widened at many places due to solution activity and later filled with clay, Kankar silt, etc. They are (I) S 10^0 E joints (2) N 80^0 W joints (3) N 40^0 E joints and (4) S 70^0 E joints. Of these, the first two are prominent. No other important structural features like faults, folds, etc were noticed in the area explored.

General Description

Jaggayyapeta Limestone Mines is a captive mine of RINL and is working since March 1989. The total lease area is covered for an extent of 1295 hectares out of which 900 hectares falls inside the forest area and balance 395 hectares is non forest land. The average grade of limestone available is

% CaO 49.44

%MgO	1.65
$\%SiO_2$	8.24
$\%Fe_2O_3$	0.61
%LOI	38.05
%AI	10.83

Limestone (CaCO3) is used as flux for iron and steel making. This mine is located in Jaggayyapeta Mandal of Krishna District.(A.P.) At present 3.6 lakh T of limestone is produced per annum to meet the requirement of 3.0 million T production of steel at VSP .

Method of Working :

The mining operation is carried out by shovel-dumper combination and sizing is done in two stages at Crushing & Screening plant to achieve -70mm size. The sized limestone is dispatched to VSP, Visakhapatnam by Railways.

JLM Jaggayyapet is operating with total 92 manpower distributed in different sections viz. Mines (Mining operations),Central Repair shop(HEMM maintenance),Crushing and Screening Plant (Sizing plant) , Electrical (receiving, distribution and use of electricity) , wagon loading (Dispatch of Lime Stone), Materials Management , Civil , Finance, Personnel to carry out the related activity of production and dispatch of Limestone of required physical and chemical quality and quantity for manufacturing of steel at VSP.

Safety Management:

The safety, environment and health is taken care by empowered committee constituted for the purpose consisting of senior officers of the mines and officers from head quarters. The participation of workers in the safety management is aptly ensured through statutory forums viz. Pit safety Committee & Workman's Inspector and formal committees e.g. Shop Floor Meetings , Samalochana and other such forums.

MINE RESUME

1. Name & Location of the Mine : Parasakti Limestone Mine, Jettipalem
2. Name of the Mineral : Limestone
3. Name of the owner : Sri P.Yaswanth Krishna
4. Name of the Agent : Sri A.Sambasiva Rao
5. Agent phone number : +919866700011
6. Agent mail ID : works@parasakticement.com
7. Name of the Manager : Sri G.Chandrasekhar
8. Manager phone number : +91 9701000576
9. Manager mail ID : mines@parasakticement.com
10. Postal Address of the Mine : Post: Jettipalem-522421, Rentachintala(M), Guntur (D)
11. Extent of Mining Lease : 317.782 Hectars
12. Date of opening of the Mine : 05.05.2005
13. Total Reserves : 82.146 million tones
14. Production 2017-18. : 11,59,606 MT
15. Stripping ratio : 1 : 0.02
16. Productivity (OMS) : 90 MT
17. No. of persons employed : 48
18. No. of Shifts operated : 02
19. Mine is operated by Mechanized/ semi Mechanized/manual method : Mechanized

Brief description of the deposit geology :

The Limestone deposit of Parasakti Limestone Mine belongs to tiny part of the Proterozoic Palnadu basin extending across the Krishna River in to Nalgonda and Guntur districts. The area is essentially underlain by carbonate rocks correlatable to the Narji Limestone formation of Kurnool Group.

Description of Machinery deployed

S. No.	Equipment	Make	Model	Capacity	Qty
1	Excavator	TATA	Zaxis 650 H	3.1 Cu.m	02 Nos.
2	Excavator	TATA	EX 400 H	1.8 Cu.m	01 Nos.
3	Excavator	TATA	Ex 200 H	Rock Breaker	01 Nos.
4	Dumpers	BEML	BH 35	35 Tonnes	05 Nos.
5	Dozer	BEML	D-80 A-12	30 Tonnes	01 Nos.
6	Compressor	CP	CPS-450	450 cfm	01 Nos.
7	Rock Drill	JRD	JRD CD-110	4.5” Dia	02 Nos.
8	Water Tanker	TATA	1613	10 KL	01 Nos.
9	Electrical Compressor	Atlascopco	GA90	414 cfm	01 Nos.

MINE RESUME

BHAVYA LIMESTONE MINES

M/s. BHAVYA CEMENTS LIMITED

1. Name & Location of the Mine	:	**BHAVYA LIMESTONE MINE** M/s. Bhavya Cements Limited, Tangeda (Vi), Dachepalli (M) Guntur (Dist) – AP – 522 414
2. Name of the Mineral	:	Limestone
3. Name of the owner	:	**M/s. BHAVYA CEMENTS LIMITED**
4. Name of the Agent	:	**M.A.AMRUTHA RAJU** Vice President (Operations)
5. Agent phone number	:	94910 66925
6. Agent mail ID	:	maaraju@bhavyacements.in
7. Name of the Manager	:	**J.RAMA KRISHNA** Dy.General Manager (Mines)
8. Manager phone number	:	94910 66936
9. Manager mail ID	:	mines@bhavyacements.in
10. Postal Address of the Mine	:	Tangeda (V), Dachepalli (M) Guntur (Dist) – AP – 522 414
11. Extent of Mining Lease	:	346.32 Ha.
12. Date of opening of the Mine	:	01.10.2010
13. Total Reserves	:	263 Million Tones
14. Production 2016-17	:	10,38,000 MT
15. Stripping ratio	:	Nil
16. Productivity (OMS)	:	143
17. No. of persons employed	:	26
19. No. of Shifts operated	:	General Shift (08.00 AM to 05.30 PM)
20. Mine is operated by Mechanized/ semi Mechanized/manual method	:	Mechanized
21. Special achievements if any	:	Zero Accident Potential Mine
22. Brief description of the geology & working	:	Enclosed

Description of the machinery deployed

S.No.	Equipment	Make	Model	Capacity	Numbers
01	Excavators	TATA	Z-axis - 450	2.5 M^3	03
02	Dumper	TATA	Euclid – 600	30 MT	02
03	Tippers	MAN	CLA 31.280	30 MT	05
04	Tippers	TATA	LPT 2518	20 MT	05
05	Rock Breaker	TATA	Ex-200 with DEMO – V2	0.9 M^3	01
06	Water Tanker	Ashok Leyland	--	12 KL	01
07	Compressor	Atta's cop co	XAH 210	450 cfm	01
08	Drilling Machine	Atta's copco	LM – 100	115 mm	01
09	Dozer	BEML	D – 155	--	01
10	Explosive van	TATA	709	3.24 MT	01

Bhavya Limestone Mine located at North East (NE) & South East (SE) of the Tangeda (Village)) (Lat: 16^0 40' N Long: 79^0 49'E in toposheet 56 P/14.). The latter is a medium sized village, with a post office, power supply and tele communication facilities, situated at about 2.5 Km to the South of River Krishna, the Village is connected to Dachepalli, the Mandal head quarters, by a 18 Km, long BT road. It is at about 105 Km N.W of Guntur, the district head quarters and at **102 Km from Amaravathi New Capital of Andhra Pradesh**. Nadikudi Junction, on the Secunderabad – Bibinagar – Guntur B.G rail way line of S.C Rly. (nearly 15 km) is the nearest rail head. The area is easily accessible and is served by bus network of A.P. State Road Transport Corporation: Dachepalli town caters to all the daily needs.

PHYSIOGRAPHY:-

The Bhavya Lime Stone Mine Area is a linear belt spanning a length of about 3.6 Km in NE- SW direction, with a maximum width of about 2000 m across. The boundary is highly jagged, with several reentering edges, on all sides (plate: II). It is a gently undulating plain, raising 80 to 93 m above M S L. The ground slopes down towards S.W.N.W and north at a gradient of 1 in 60 to 70^0. It Comprises near continuous rock exposures, flat lying or jutting above the surface – with a few patches of soil mantle of 0.1 to 0.5 m thickness. The terrain is a mixture of stony waste and cultivable land.

GEOLOGY:-

The subject Area falls on the S.W strike continuation of the 'Palnad' Lime Stone belt of the neighboring Nalgonda district. The latter is the home of several Captive Lime Stone Mine sustaining many Cement Factories in the region. The nearest such Mines and Factory are those of M/s. NCL Industries Ltd., situated across River Krishna (Plate 1.)

The Lime Stone belt is a part of the ' Narji ' Formation of 'Kurnool Group' of the 'Cuddapah Super Group' of Proteorzoic Sediments. The latter are but a part of the 'Cuddapah Basin' a fabulously vast repository of a thick pile of sediments.

METHOD OF WORK:-

Mine is operating by mechanization with HEMM for loading and Transportation of Limestone from Mines to Crusher. Arranged water sprinkling system on haul roads from mines to crusher for dust suppression. In crusher dump hopper in addition to the water sprinkler system, dry fog system also implemented to suppress the 100% dust emission from dump hopper. All mining machinery are well maintained as per the recommendation of OEM to minimize the Air Pollution from machinery.

By providing VTC through our GVTC and Internal Safety classes to the workers, safety internal competitions and safety quiz programs improving safety skills to all workmen.

With the guidance of DGMS and by implantation of all rules and regulations framed by Directorate time to time our mine got many safety awards in safety weeks and by other safety competitions.

SAFETY FIRST – ALL NEXT

MINE RESUME

Name & Location of the Mine	:	DCW Limestone Mine, Gamalapadu (V), Dachepalli – 522 414, Guntur Dist, A.P.
Name of the Mineral	:	Limestone
Name of the Owner	:	M/s Andhra Cements Limited
Name of the Agent	:	Sri M. Prabhakar Rao
Agent Phone Number	:	9491044013
Agent Mail ID	:	mp.rao@jalindia.co.in
Name of the Manager	:	Sri Bapana Narasimhulu
Manager Phone Number	:	09490400847
Manager Mail ID	:	dcw.mines@jalindia.co.in, narasimhulu.bn@jalindia.co.in
Postal Address	:	Andhra Cements Ltd., Durga Cement Works, Srinagar Post, Dachepalli – 522 414, Guntur Dist. A.P.
Extent of Mining Lease in Hectares	:	170.22 Hectares.
Date of Original grant	:	19.01.1978
Date of Re-opening of the Mine	:	18.09.2012
Total Reserves	:	52.443 Million Tons as on 01.07.2017.
Production during 2017-18	:	14,14,570 MT
Stripping Ratio	:	NA
Powder Factor	:	7.5 MT / Kg of Explosive.
No. of Persons employed	:	49 Nos
No. of Shifts operated	:	02
Mine is operated by Mechanized/ Semi-Mechanized/Manual Method	:	Mechanized Mine
Special Achievements if any	:	NA

Brief description of Geology of the Deposit:

According to the geological survey of India, this area forms part of the Palnad basin, this is considered to be the extension of the Kurnool basin. The Limestone in this area is considered as being equivalent to Narji Limestone. Detailed work carried out in various parts of the Palnad basin in connection with the limestone investigations have thrown considerable light on the scale of the tectonic disturbances, as well as the grade of metamorphism and metasomatism exhibited by these rocks. Since the main tectonic stresses associated with the eastern ghat orogany, has acted from the east or ESE direction the entire sequence, in the Palnads, yielded to thrusting by over – folding and subsequently to contemporaneous shearing. The shears are of the low angle type, the angles scarcely exceeding 10. Since this area form a part of the eastern extremity of the Palnad basin, it has been disturbed by the post Cuddapah tectonic movements. These structural disturbances are seen in the form of shearing and thrusts. One of the major thrusts is seen near the eastern margin in the existing leasehold close to the Naguleru and another thrust of lesser magnitude is seen at the western margin of the lease close to the Rallavagu.

The deposit being formed as overlapping consecutive leases both varying in thickness and color. The quality variation depicted by the color both laterally and vertically downwards along with certain alternate bands striking north – west approximately. Silica being strategic factor in deciding suitability of limestone for cement manufacture grows approximately @ 1% per every 5 meter in the SW portion of the lease hold designated as PIT – II. Four limestone types were identified in the lease area on geological mappings; these are dark grey, light grey, white and pale green limestone. Simultaneous with geological mapping, outcrop samples are collected along all lines in order to have an idea about the quality of individual limestone bands. From the chemical analysis of the outcrop samples, it was found that the dark gray limestone has the best quality analyzing generally between 85.0 to 90.0% TC. However, sometimes due to the presence of shale partings, the quality of dark gray limestone may be marginally lower. As compared to the dark grey limestone, the light grey limestone is slightly lower in quality, generally varying between 80.0 – 86.0%. However, wide fluctuations in the quality is noted; while at times the quality was found drop as low as 72.8% TC., it even goes up to 93.8% TC. The occurrence of thin veins of calcite/quartz and presence of shale partings cause these fluctuations in the quality. The quality of the outcrop samples collected from those two bands has also indicated that there is a wide variation in the quality – the range in quality swinging from a low of 69.8 to 80% to a high of 88.0% TC.

Description of Machinery deployed:

S. No.	Equipment	Make	Model	Capacity	Numbers	HP
01	Shovel	Kobelco	SK380HDLc	2.0 m^3	03	262
02	Tippers	Ashok Leyland	2518	17 MT	10	180
03	Dozer	Komatsu	D – 85ESS – 2A	5.0 m^3	01	200
04	Drill	Atlas Copco	ROC D60	858 cfm	01	440
05	Rock Breaker	Hyundai	R 210W-9S	30 MT/Hour	01	166
06	Explosive Van	Tata	LPT 1613	10 MT	01	130
07	Mobile Service Unit	Tata-AGS ELGI	LPT 1613	---	01	130
08	Diesel Tanker	Tata	LPT 1613	10 KL	01	130
09	Water Tanker	Ashok Leyland	2214/4s	20 KL	01	140
10	Camper	Mahindra	-	-	01	45

Budawada Limestone Mine
UltraTech Cement limited
Balaji Cement Works

1. Name & Location of the Mine	: Budawada Limestone Mine, Budawada
2. Name of the Mineral	: Limestone
3. Name of the owner	: M/s UltraTech Cement Limited
4. Name of the Agent	: Sri K.N. Sidda Reddy
5. Agent phone number	: +91 7039023088
6. Agent mail ID	: kns.reddy@adityabirla.com
7. Name of the Manager	: Sri Manoj Behari
8. Manager phone number	: +91 9440146784
9. Manager mail ID	: manoj.behari@adityabirla.com
10. Postal Address of the Mine	: Budawada Vill, Jaggaiahpet-Mandal, Krishna Dist, A.P., Pin- 521175
11. Extent of Mining Lease	: 629.22 Hectares
12. Date of opening of the Mine	: 7th March' 2012
13. Total Reserves	: 367.85 Million Tonnes
14. Production 2017-18	: 2702971.00 MT
15. Stripping ratio	: 1:0.01
16. Productivity (OMS)	: 110.70 MT
17. No. Of persons employed	: 93
18. No.of Shifts operated	: 2 Shifts
20. Mine is operated by Mechanized/ semi Mechanized/manual method	: Mechanized
21. Special achievements if any	: Zero Accident working
22. Brief description of the deposit geology	: Almost the entire area of mining lease is occupied by the craggy outcrops of Narji limestone with thin local patches of reddish brown soil, rich in lateritic gravel.

23. Description of Machinery deployed :

Sl. No.	Equipment	Make	Model	Capacity	Numbers
1.	Excavator	Komatsu	PC – 1250 8R	690HP/6.5 M^3	2 Nos.
2.	Excavator	Tata	Hitachi EX-1200	760.36 HP/6.5 M^3	1 No
3.	Excavator	Komatsu	PC – 600	340HP/2.7 M^3	1 No.
4.	Dumper	Komatsu	HD-465 - 7EO	712HP/55 Ton	14 Nos.
5.	Drills	Atlas Copco	ROC L8(25)	440HP/163 mm dia.	2 Nos.
6.	Dozer	Komatsu	D 275A-5R	451 HP	2Nos.
7.	Rock Breaker	Hyundai	HDB210-9	166 HP	1 No.
8.	Excavator cum Rock Breaker	Komatsu	PC-300LC-7	242HP/1.4 M^3	01No
9.	Grader	Komatsu	GD511	160 HP	1 No.
10	Grader	LIUGONG	GRADER 414	150.19HP	01No
11.	Water Tanker	Tata	SE1613C	130 HP	2 Nos.
12.	Explosive Van	Tata	LPT1613/42	9.6 MT	1 No.
13	Explosive Van	Tata	LPT 909BSIV	6.5 MT	1 No.
14.	Lighting Towers	Sigma	MODEL: CA 16	16HP	2 Nos.
15.	Lighting Towers	Aska	Mv/IL2E	10 HP	1 No
16.	Welding DG	ADOR	S.Chal.501,CPCB	600Amp	01No
17.	Tyre Handler	Godrej	497 TC Telco	100HP	01No

MINE RESUME PETASANNIGANDLA LIMESTONE MINE of M/s. SRI CHAKRA CEMENT LTD.

1. Name & Location of the Mine	:	**Petasannigandla Limestone Mine.** **M/s. Sri Chakra Cement Limited** **Karampudi, Guntur Dist – 522 614.**
2. Name of the Mineral	:	**Limestone.**
3. Name of the Owner	:	**Sri. K.Vijaya Kumar- Joint Managing Director**
4. Name of the Agent	:	**Sri. D.V.D.S.N Murthy**
5. Agent Phone Number	:	**9703219022**
6. Agent Email Id	:	**scclunit1@gmail.com**
7. Name of the Manager	:	**Sri. B.Guru Sekhar Reddy**
8. Manger Phone Number	:	**9703219135.**
9. Manager Email Id	:	**scclunit1@gmail.com**
10. Postal Address of the Mine	:	**Petasannigandla Limestone Mine** **M/s. Sri Chakra Cement Limited** **Karampudi,(Post) (Mo)** **Guntur Dist – 522 614. Andhra Pradesh.**
11. Extent of Mining Lease	:	**202.138 Ha**
12. Date of Opening of the Mine	:	**23.12.1982**
13. Total Reserves	:	**62.92 Million Tones**
14. Production 2017 – 2018	:	**5,74,016 M.Tones**
15. Stripping Ratio	:	**1 : 0 : 1**
16. Productivity (OMS)	:	**35 Mts**
17. No Of Persons Employed	:	**36 Nos**
18. No.of shifts Operated	:	**General Shift.**

19. Mine is Operated by Mechanized /Semi **: Mechanized.**

Brief note on Petasannigandla Limestone Mine:

Geology of the Mine:- Our Mining lease area and its surroundings are found to contain the following statgraphically formation in General.

Kurnool -------- (Panyam Quartizite)
(OWK SHALES) - JAMMALAMADUGU SERIES. (NARJI LIMESTONE)
CUDDPAH SUPER GROUP UN-CONFIRMITY CUMBUM SHALE

Un-confirmable on the Cuddapah, the Palnadu Series occupies a major portion of the North, Eastern extremely of the Cuddapah basis stress along with the banks of Krishna river.

Limestone beds occupy mostly in the raised Hills area in the region. In this series that the Limestone extents to the flat area lying with in the Hills also. The General strike of the ore body is NE-SW dipping at 20 Degree towards E-S.E.

Description of the Machinery Deployed

S.No	Equipment	Make	Capacity	Numbers
01	PC–300 (Backhoe)	L&T	1.7 Cum	01
02	Volvo (FM)	Volvo	25 Mts	03
03	PayLoader	L&T	1.5 Cum	01

KAKATIYA LIMESTONE MINE
M/s KAKATIYA CEMENT SUGAR & INDUSTRIES LTD

SRINIVASA NAGAR, JAGGAYYAPET

1. Name & Location of the Mine	:	Kakatiya Limestone Mine ;Jaggayyapeta(M) Latitude: 16°51'09.6" Longitude: 80°02'47.2"
2. Name of the Mineral	:	Limestone
3. Name of the Owner	:	Kakatiya Cement Sugar & Industries Ltd
4. Name of the Agent	:	Sri. D. G. K. Raju
5. Agent phone Number	:	9492124319
6. Agent mail ID	:	kcsilc@kakatiyacements.com
7. Name of the Manager	:	Sri. M. Devanand
8. Manager Phone Number	:	9491165126
9. Manager Mail ID	:	devanand_nithya10@yahoo.com
10. Postal Address of the Mine	:	Srinivasanagar, Jaggayyapeta-521175 Krishna (Dist) Andhra Pradesh
11. Extent of Mining Lease	:	121.41 Ha.
12. Date of opening of Mine	:	20.11.1982
13. Total Available Reserves	:	37.69 Million Tons
14. Production 2017-18	:	2,25,000.000 MT
15. Stripping Ratio.	:	1 : 0.08
16. Productivity (OMS)	:	
17. No of persons employed	:	30
18. No of Shifts operated	:	02
19. Mine is operated by Mechanized/semi Mechanized/Manual method	:	Mechanized
20. Special achievements if any	:	NIL

21. Brief description of the deposit geology

The Limestone deposit of **Kakatiya Limestone Mine** The Lease hold is covered by the following rock types which forms part of the 'Cuddapah Basin"

Proteozoic	Kurnool Group	Narji Formation	Greenish Argillaceous Limestone (GAL)
			Ash Grey Limestone (AGL)
Proteozoic	Cuddapah Super Group		Dark Grey Limestone (DGL)
----------Unconformity----------			
Archean			

The subject area is a part of the Palnad sub-basin on the northern dip of the crescent-shaped Cuddapah Basin. The intra-cratonic basin, which comprises essentially sedimentary rock formations of Cuddapah Super group and Kurnool Group belonging to the Proterozoic period. The Lithological assemblages of Cuddapah Super Group show predominance of shale/slate/phyllite and quartzite whereas those of the younger Kurnool Group show predominance of limestone. In the northeastern part of the Palnad sub-basin, the Cumbum formation of Nallamalai group rests over Narji Limestone of Kurnool group with a thrust contact. The Narji Limestone exhibits a high degree of deformation in the form of multiple folds and shears closer to thrust contact..

The limestone is dark grey in colour, very fine grained, dense, thick bedded, massive to blocky or even slabby, breaking with a smooth conchoidal fracture. It is stylolitic, the stylolites being highly crenulated following mostly bedding planes. The outcrops of limestone peep out of the ground as linear walls dipping at steeper angles of 30 to 45 towards southeast. The steeper dips are due to fracture cleavage, and the beds dip sub-horizontal in the same direction as that of the fracture cleavage

Description of Machinery deployed:

S.No.	Equipment	Make	Model	Capacity	Quantity
1	Excavator	L&T	PC200	0.9 Cum	01
2	Excavator	Hyundai	PC.210	0.9 Cum	01
3	Compressor	CP	CP450	450 Cfm	01
4	Wheel Loader	(Liugong)	CLG-835	1.8 Cum	01
5	Drills	Atlas Copco	BVB.25	115 mm	01
6	Tippers	Leyland	-	20 MT	05

HEMADRI CEMENTS LIMITED, VEDADRI

HEMADRI LIMESTONE MINE RESUME

Name & Location of the Mine	: HEMADRI LIMESTONE MINE, VEDADRI
Name of the Mineral	: LIMESTONE
Name of the Owner	: M/S.HEMADRI CEMENTS LIMITED, CHENNAI
Name of the Agent	: Sri.P.Ramakrishna Rao
Agent Mail ID	: hemadricementslimited@gmail.com
Name of the Manager	: Sri.R.Ram Reddy , Dy.General Manager
Manager Phone Number	: 9052117848
Manager Mail ID	: dgmmines@hemadricements.com
Postal Address	: Vedadri-Village, Jaggayyapet-Mandal, Krishna-Dist, Andhra Pradesh (PIN): 521 457.
Extent of Mining Lease in Hectares	: 38.68 Hect.
Date of Opening of Mine	: 01.04.1985
Total Reserves	: 1.3 Million Tons (Reserves) : 8.3 Million Tons (Resources)
Stripping Ratio	: 1: 09 Tons
Powder Factor	: 3.5 Tons
Productivity (OMS)	: 18 Tons
No of Persons Employed	: 30
No of Shifts Operated	: One Shift (In day light Hours)
Mine is operated by Mechanized/Semi-Mechanized/Manual Method	: Mechanized (medium)
Rief description of Geology of Deposit	: The bedding of the Limestone is in general Strike **N.E. - S.W.** Directions with dips of 10 ^{o} to 40^{o} Towards Northwest. Strike Length: 1300 meters, In NE-SW Direction. Width of the deposit: 130 m to 400 m Overburden an average 8 meters
Special Achievements if any	: Secondary blasting is totally avoided by deploying Hydraulic Rock-Breaker.

Description of Machinery deployed

S.No.	Description of Machinery	Make	Model	Capacity	Numbers
1	Excavator – Backhoe	L &T Komatsu	LTPC2006	$0.9M^3$	2
2	Hydraulic Rock Breaker	L &T Komatsu	LTPC2006	80T/Hr	1
3	Portable Compressor	ELGI	2011	600CFM	1
4	Wagon Drill	DTH/KRD	2012	115mm	1
5	Tipper	AMW	2011&2012	17tons	6
6	Water Sprinkler	TATA - HYWA	2008	10kL	1
7	Tractor Dozer	John - deer	2011	-	1
8	Explosives Van	Swaraj-Mazda	2014	3Ton	1

MANGAMPET BARYTES MINE

M/s. A P Mineral Development Corporation Ltd

MINE RESUME

1. Name of the Mine	:	Mangampet Barytes Mine
2. Name of the Mineral extracted	:	Barytes
3. Name of the Owner	:	Sri.Ch.Venkaiah Chowdary, VC&MD,APMDC Ltd.
4. Name of the Agent	:	Sri. H.D. Nagaraja
5. Name of the Manager	:	Sri. L. Shiva Babu
6. Location Address	:	Mangampet(v&p),Obulavaripalli(M),YSR (dt),AP
7. Total M.L. Area	:	225.0139 Hectors or 556.0093 Acres
8. M.L. Valid up to	:	01.09.2018 (Renewed for another 20 years)
9. Total Reserves	:	73.3 Million Tones
10. Annual Output	:	14,80,404.455 MTs
11. Stripping Ratio	:	1:6.6 (by Weight)
12. Powder Factor	:	8.4T/Kg of Explosive
13. OMS	:	6.71
14. Average No. of persons Employed in mine	:	860
15. No. of Shifts operated	:	03
16. Mine is operated Mechanised/ Semi-Mechanised	:	Highly Mechanized
17. Brief Notes on/Location/ Geology	:	Enclosed in Annexure-1
18. List of Mining Equipment	:	Enclosed in Annexure-2
19. Miscellaneous information If any	:	Enclosed in Annexure-3

Annexure – 1

LOCATION:

Mangampet Barites deposit covering an area of 2.233sq.km, is located in Mangampet (V), Obulavaripalli(M), YSR District, Andhra Pradesh. Mangampet Barytes Deposit is the single and largest among the known bedded Barites Deposits in the world with an estimated 25% of the world's Barites resources. It is geographically located between 14^{0}00'30" N.Latitude and 79^{0}19'00-79^{0}19'30" E.Longitude falling in the Survey of India Topo Sheet No.57N/8.

ACCESSIBILITY & COMMUNICATION:

The Mangampet Barytes Project is, situated 55 km north of the temple town Tirupati, in YSR district, Andhra Pradesh. It is well connected to the nearby cities/ports by all weather black top roads and Rail. Kadapa-Tirupati State high way passing at about 1 Km east of the project site. The nearest Railway Station is at koduru which is

9.0 km from project & located on Chennai-Guntakal broad gauge section of South Central Railway. The nearest town koduru is 9.0 km & kadapa, the district head quarters is 80 km. The nearest Airport Tirupati is 69 km while the nearest port City Chennai is 190km from the mine.

Amenities like Posts & Telegraph offices, Police Station, Primary Health Centre and other facilities are available at koduru, Telecommunication net work is available at the project also.

GEOLOGY & STRUCTURE :

The Mangampet Barytes Deposit is confined to the Pullampet Formation in the Nallamalai Group of Cuddapah Super Group in crescent shaped Cuddapah Basin of Proterozoic age. The detailed filed and petro graphic studies by Geological Survey of India (GSI) led to the identification of a predominantly volcanogenic Formation comprising tuff with intercalations of quartz-crystal tuff, barites and dolomite. Mangampet barites deposit occurs in the form of two lensoid bodies, the Northern and the Southern lenses within the tuff beds. The Mangampet Barytes project is the Northern lens where the beds of grey granular barites overlain by those of Lapilli-barytes constitute the ore Zone.

The Northern lens deposit has a strike length of 1220m with a maximum width of 900m, occupying an area of 0.81 sq.km. An additional area of 162.594 Ha was added to the total area and therefore, the extent of the mine lease was increased to 2.233 sq.km with the amalgamation of adjoining lease areas.

The Northern lens occurs in the form of a doubly plunging syncline with its axis trending NNW-SSE which is cross-folded around ENE-WSW axis.

Annexure – 2
LIST OF MINING EQUIPMENT

SI. NO	Equipment	Make & Model	Capacity	No. of Units	Power (HP/KW)
1	Drill Machine	Atlas Copco & ROC L8	140mm	5	430 HP
2	Drill Machine	Doosan (HP450) & Atlas Copco (D35)	450CFM&114mm	4	169 HP
3	Drill Machine	(IR 450) & Atlas Copco LM100		2	169 HP
4	Drill Machine	Atlas Copco (210) & Atlas Copco(D35)		1	169 HP
5	Excavator	Hitachi & ZAXIS870H-3	4.3Cu.m	-	532 HP
6	Excavator	Volvo & EC750D	4.26Cu.m	4	508 HP
7	Excavator	Hitachi & ZAXIS470H - 5G	2.5Cu.m	3	315 HP
8	Excavator	L&T Komatsu & PC450 LC-7	2.85Cu.m	1	347 HP
9	Excavator	L&T Komatsu & PC300	2.1Cu.m	1	242 HP
10	Excavator	Hitachi & EX 200	0.9Cu.m	1	159 HP
11	Rock Breaker/Bucket	L&T Komatsu & PC 210	0.9Cu.m	1	156 HP
12	Dumper Truck	BEML & BH85-1	85 Ton	4	883 HP
13	Dumper Truck	Komatsu & HD785-7	100 Ton	5	1200HP
14	Truck	Volvo & FMX440	39 Ton	15	440 HP
15	Truck	Volvo & FMX440	31 Ton	0	440 HP
16	Truck	Scania &P410	39 Ton	30	410 HP
17	Dozer	Komatsu & D155A-6	360HP	3	360 HP
18	Dozer	Komatsu & D155A-5	302 HP	1	302 HP
19	Dozer	BEML & D80	180HP	0	180 HP
20	Motor Grader	CAT&CAT140H	185HP	1	185 HP
21	Motor Grader	Volvo & G930	204HP	1	204 HP
22	Wheel Loader	Komatsu & WA900-3	9Cu.m	1	856 HP
23	Wheel Loader	Hindustan & HM 2021	1.7 Cu.M	1	115 HP

24	Sleipner	Sleipner E120-700	123Ton	1	
25	Sleipner	Sleipner E90-700	90 Ton	1	
26	Water Sprinkler	BEML & LW35	28KL	2	375 HP
27	Water Sprinkler	Hindustan & HM 1035N	28KL	2	399 HP
28	Water Tanker	Volvo & FM 400	20KL	3	400 HP
29	Water Tanker	Man & CLA 25.280	20KL	1	280 HP
30	Water Tanker	Tata & LPK2518	16 KL	1	180 HP
31	Water Tanker	Ashok Leyland & Comet	8KL	1	112 HP
32	Diesel Tanker	Volvo & FM400	16KL	1	400 HP
33	Diesel Tanker	Ashok Leyland & TAURUS	20KL	1	183 HP
34	Diesel Tanker	Ashok Leyland & Tusker	8KL	1	125 HP
35	Diesel Tanker	Ashok Leyland & Comet	8KL	1	112 HP
36	Mobile Service Van	Ashok Leyland & Comet		2	112 HP
37	Crane	ESCORT & Hydra 12 SB-4	12 Ton	1	58 HP
38	Crane	ESCORT & Hydra 14 SB-4	14 Ton	1	59 HP
39	Mobile Lighting DG	Doosan & DLS 4000		12	6 KW
40	Mobile Lighting DG	Doosan & L5P		1	6 KW

Annexure – 3

MINE PIT WATER MANAGEMENT AT MANGAMPET BARYTES MINE

Presently we are working at the depth 150 mtrs from the surface. Main constrain for working at greater depth is controlling ground water in the form of seepage. In addition to regular Seepage of water into the mine, the existing water accumulated in the surrounding abandoned Mines of Mangampet project may also add to the problem of pumping. It is observed that the regular make of water in the mine is around 600-700 LPS, whereas during rainy season it is around 1200 LPS and the water is pumped out by using as many as a fleet of 15 pumps with cumulative HP of 5800 bailing around 1540 LPS of water to the surface. Thus keeping bottom floor dry for winning of ROM

MINE RESUME

Name & Location of the Mine	: Bharathi Cement Limestone Mine, M/s Bharathi Cement Corporation Private Limited, Nallalingayapalli Village, Kamalapuram Mandal, YSR (Kadapa) Dist., Andhra Pradesh, Pin: 516289.
Name of the Mineral	: Limestone.
Name of the Owner	: Shri JJ Reddy, Nominated Owner & Director(Projects)
Name of the Agent	: Shri M Sai Ramesh, Sr. Vice President (Works)
Agent Phone Number	: 8985002121
Agent Mail ID	: sairamesh.m@vicat.com
Name of the Manager	: Shri Kalidindi Sudhakar, Chief Manager (Mines)
Manager Phone Number	: 8985600605
Manager Mail ID	: sudhakar.k@vicat.com
Postal Address	: same as above
Extent of Mining Lease in Hectares	: 1562.36 Acrs (632.278 Hec)
Date of Opening of Mine	: 02.02.2009.
Total Reserves	: 202.01 Million MT
Production during 201 7	: 3626263 MT
Stripping Ratio [Ore (T):Over Burden(M^3)]	: 1 : 0.061
Powder Factor	: 9.66
Productivity (OMS)	: 246.86
No. of Persons employed	: 78
No. of Shifts operated	: 2
Mine is operated by Mechanized/ Semi-Mechanized/Manual Method	: Mechanized.
Brief description of Geology of Deposit	: The subject area forms part of the well-known crescent shaped Cuddapah Basin with middle Proterozoic sediments and igneous 61ntrusive and flows. The Cuddapah Supergroup comprising mainly arnaceous and argillaceous sediments with sub-ordinate calcareous facies is overlain uncomfortably by the Kurnool Group with essentially calcareous rocks. The latter is present in three sub-basins viz. the northernmost Palnad, northern Srisailam and middle Kurnool sub-basins. The Narji Limestone is economically the most significant formation based on which a number of cement plants have been established in the region. It is well developed and has an extensive distribution. It starts as highly siliceous limestone with pink and purple colours and thin lenticular bands of gritty, ferruginous sandstone at places. The middle portion is made up of bluish grey massive and thickly bedded limestone of cement grade. It grades into calcareous flags, which are mined as flooring and roofing material.

Limestone of Narji Formation is massive and fine grained with ubiquitous stylolites. It is overlain by flaggy limestone known as *napa* slabs. The formations, regionally, have a NNW-SSE to NW-SE strike with 5 to 15° northeasterly dips

Special Achievements if any :

Description of Machinery deployed :

S. No.	Equipment	Make	Model	Capacity	Numbers
1	EXCAVATOR	KOMASTU	SAA6D170E-3	6.5 CU.MT	1
2	EXCAVATOR	KOMASTU	SAA6D140E-5	4.5 CU.MT	1
3	EXCAVATOR	KOMASTU	SAA6D170E-5	6.5 CU.MT	1
4	WHEEL LOADER	KOMASTU	SAA6D170E-5	6.5 CU.MT	1
5	DOZER	KOMASTU	SAA6D140E-2	60 TON	1
6	DUMPER	KOMASTU	SAA6D170E-3	55 TON	10
7	WATER TANKER	LEYLAND	ALU 401	12 KL	1
8	MOBILE SERVICE VAN	LEYLAND	ALU 401	4 KL	1
9	TYRE HANDLER/ FORK LIFT	GODREJ	497 TC	6 TON	1
10	EXPLOSIVE VAN	LEYLAND	ALU 401	10 TON	1
11	BMD TRUCK	LEYLAND	ALU 401	6 TON	1
12	DRILL	ATLASCOPCO	POWER ROC D-40	450 CFM	1
13	DRILL	ATLASCOPCO	POWER ROC D-50	650 CFM	1
14	SOIL COMPACTOR	L & T	1190 D		1

NAWABPET – TALAMANCHIPATNAM LIMESTONE MINE

Dalmia Cement (Bharat) Limited

MINE RESUME

Name of the Mine	:	NAWABPETA-TALAMANCHIPATNAM LIMESTONE MINE Of M/s Dalmia Cement (Bharat) Ltd.,
Name of Mineral Extracted	:	LIMESTONE – *CEMENT GRADE*
Name of the Owner	:	Shri. T.VENKATESAN, Nominated Owner (Dy. Managing Director)
Name of the Agent	:	Shri. K.KARUNAKARA RAO, AED (Operations)
Name of the Manager	:	Shri. K V SURESH REDDY, DGM (Mines)
Postal Address	:	CHINNAKOMERALA (VILLAGE & POST) MYLAVARAM (MANDAL), KADAPA (DT) ANDHRA PRADESH. – 516433
Total Extent M.L Area	:	407.05 Hectares
Date of commencement of operation	:	24.07.2008
M.L. Valid Up to	:	23-06-2038
Total Minerable Reserves	:	90.81 million ton
Annual Output	:	3.2 million ton
Stripping Ratio	:	1: 0.33
Powder Factor	:	11 MT/Kg.
OMS	:	124Mt
Average No. of persons employed in mine.	:	64
No. of Shifts operated.	:	2
Mine is operated: Mechanised / Semi-Mechanised.	:	Mechanized

Brief Description About Mine

The Nawabpet- Talmanchipatnam Limestone mine of Dalmia Cement (Bharat) Ltd is located in the Nawabpet- Talamanchipatnam villages of Mylavaram mandal of Kadapa District over an extent of 407.05 Hectare with the operation capacity of 3.2 MTPA. The Mining Operations is being carried out by fully mechanized opencast method of working by shovel-Dumper combination and deep hole Drilling & Blasting practices. The operations are being carried in two shift operations.

The Mine is being working with two production benches each 8-9m height and one OB bench 4-5m height. The OB material is directly handling by shovel- dumper combination and systematically dumped all along the Mine boundary. The drilling operation is being carried out by ROC L6 Machine (150mm) and the Blasting operations are being carried out conventional method with ANFO, Slurry and NONEL.
The loading & transportation is done by Komatsu PC1250 Excavators (6.5cum) and HD 465 Dumpers (55T). The Pit head crusher is located in the ML area (1000T/Hr). The crushed limestone is being transported by 3Km long closed Cross Country Belt Conveyor (CCBC).

The Eco-friendly mining operations are being followed by deployment of Rock breaker for secondary breaking and Installation of screening plant to minimize waste generation from mines.

Unique Features and Innovation process adopted at the Mine

- ✓ The Safety and Environment are taken care from the stage of project conceptualization.
- ✓ The optimum size of the fleet and of latest technology machines minimizes the exposure of workmen to the safety and environment risks.
- ✓ The mine layout also designed for wide roads, gentle gradients and long curves.
- ✓ The benches floors are being developed in smooth surfaces.
- ✓ Air born dust is being controlled by wet drilled and continuously wetting the material & haul road with permanent and mobile water sprinklers.
- ✓ Dust generated in the crusher area is being controlled by bag house system & wetting the material in crusher hopper by dry fog system.
- ✓ Every year the mine carries out a massive plantation program in coordination with surrounding community. Till now the mine planted 80683of saplings in ML area and outside the ML area and achieving the 90% Surveillance.
- ✓ The mine worked out area is being used for rain water harvesting purpose and the same water is being used for plant and mines operational purpose.
- ✓ The following management systems are being followed in the Mines & Plant since commissioning of plant.
  - ISO 9001:2015 Quality Management System
  - ISO 14001:2015 Environment Management System
  - ISO 18001:2007 OSHAS
  - ISO 5001:2011 Energy Management System
  - Implementing the **5'S** practices in Mines & Plant.
- ✓ The Mine & Plant have been achieved many prestigious awards from various external agencies
  - Gem Granite's Environment Award for the Year 2015-16 Given by FIMI
  - 5S Model Company Award for the year 2017- Given by ABKAOTS
  - National Energy Leader Award - Given by CII.

MINE RESUME

Name & Location of the Mine	:	Zuari Limestone Mine, Yerraguntla
Name of the mineral	:	Limestone
Name of the Owner	:	Sri.S.K.Tiwari
Name of the Agent	:	Sri. Sri.K.V.S Sarma
Agent Phone Number	:	08563275107
Agent mail id	:	k.venkatasubrahmanyamsarma@zcltd.com
Name of the Manager	:	Sri.K.V.S Sarma
Manager mail id	:	k.venkatasubrahmanyamsarma@zcltd.com
Manager Phone Number	:	9676404562
Postal Address	:	M/s. Zuari Cement Limited, Krishna Nagar – 516 311, Yerraguntla, Kadapa -District, Andhra Pradesh.
Extent of Mining Lease in Hectares	:	656.68 Ha
Date of opening of Mine	:	04.05.1984
Total Reserves	:	315.14 million Te
Production during (2017-18)	:	3450000 Te
Stripping Ratio	:	1:0.11
Powder factor	:	9.7
Productivity (OMS)	:	140
No.of Persons employed	:	75
No. of Shifts operated	:	03
Mine is operated by Mechanized/Semi-Mechanized/Manual Method	:	Mechanized

Brief description of Geology of Deposit:

REGIONAL GEOLOGY

The different rock formations occurring in the area are shown below in their order of superposition, with the oldest at the bottom and youngest at the top.

Age		Description	
		Alluvium, gravels and soils	
		Nandyal Shales	
Recent and sub-Recent	KURNOOL	Koilkuntla Limestone	
Upper Pre-Cambrian to	SYSTEM	Panyam Quartzite	
Cambrian		Owk Shales	
		Narji Limestone	
----------------------Unconformity----------------------------			
		Iriakonda Quartzite.	
		--------Unconformity-------	
		Cumbum Shales.	
		Bairenkonda Quartzite.	
		--------Unconformity-------	
Upper Pre-Cambrain	KADAPA	Tadipatri Shales	Basic
	SYSTEM	Pulivendla Quartzite	Igneous
			Intrusive
			Lava
			Flows
		--------Unconformity-------	
		Vempalli Dolomites	Basic
		And shales	Igneous
		Gulcheru Quartzite	Lava
			Flows
	---------Eporchaean Unconformity---------		
		Basic dykes	
		Quartz reefs	
		Granites	
Archaean		Amphibolites	
		Schists	

The extensive limestone occurrences extending from Yerraguntla to Tadipatri in Ananthapur- district falls under Jammalamadugu series of Kurnool system.

The mine area does not consist of any toxic elements.

TOPOGRAPHY:

The region overall has a flat topography and the general elevation of the land is 153.00-165.00 m from the sea level with a relief of 12m. There is no forest within a radius of 1 Km. Most of the land surrounding the area is devoid of thick vegetation. The Papagni and Pennar River forms the main drainage system in the area.

Special Achievements if any : No accidents occurred during the year

Description of Machinery employed :

EQUIPMENT	NOS	CAPACITY	MAKE	MODEL	HP
Shovel	02	7.2 m^3	Komatsu	PC 1250 8R	675 HP
Shovel	01	6.5 m^3	Tata	EX-1200 5D	760 HP
Dumper	04	60 te	Komatsu	HD 465 7R	720 HP
Dumper	03	60 te	Cat India Pvt.Ltd	CAT 773 E	690 HP
Drill machine	02	150 mm	Revathi Equipment Ltd	C-60 H	280 HP
Dozer	01		BEML	BD-155	380 HP
Rock Breaker Tata Hitachi	01	1.1 m^3	Atlas copco	EX-200,MB 1500	180 HP
Explosive Van	01	10 te	Ashok Leyland	E-COMET 1616	95 HP
Mobile diesel bowser	01	6 kl	Ashok Leyland	E-COMET 1112	102 HP
Motor Grader	01		Tata	TG 14	180 HP
Muck pile cum water tanker	01	30Kl	Cat India Pvt.Ltd	HM1035N	420 HP
Anfo BMD pump truck	01	**7 te**	Ashok Leyland	E-COMET 1616	95 HP
Compactor	01		L&T Construction Equipment Ltd	1190-D	**101Hp**
Tractor Hole Digger	01	540 mm	RJK-14		35 Hp`
Mobile Lighting Towers	04	5 kva	Orbit industries /kirloskar green	Opb/tm-18/ SEKG5ASI/ KG1-5AS	10 HP
Mobile service van	01		Ashok Leyland	E-COMET 1112	128 HP
Tractor	02		HMT/Mahindra & Mahindra Ltd		60 HP

MINES RESUME

1.	Name & Location of the Mine	:	COROMANDEL LIMESTONE MINE M/S The India Cements Limited Chilamkur – 516 310, Kadapa (District) Andhra Pradesh.
2.	Name of the Mineral	:	Limestone
3.	Name of the Owner	:	Ms. Lakshmi Aparna Sreekumar
4.	Name of the Agent	:	Sri P. Muni Reddy
5.	Agent Phone Number	:	9849456108
6.	Agent Mail ID	:	munireddy.p@indiacements.co.in
7.	Name of the Manager	:	M Venugopal Reddy
8.	Manager Phone Number	:	9440256341
9.	Manager Mail ID	:	venugopalreddy.m@indiacements.co.in
10.	Postal Address of the Mine	:	Coromandel Limestone Mine M/s The India Cements Limited Chilamkur – 516 310, Kadapa (District) Andhra Pradesh.
11.	Extent of Mining.Lease	:	602.137 Ha
12.	Date of opening of the Mine	:	1982
13.	Total Reserves	:	Proved : 132.36 MT Probable : 48.46 MT Possible : 92.56 MT
14.	Production 2017-18	:	14,85,000 MT
15.	Stripping Ratio	:	1:0.04
16.	Productivity (OMS)	:	60
17.	No. of persons employed	:	38
18.	No. of Shifts operated	:	03

19. Mine is operated by Mechanized/ : Mechanized

Semi Mechanized/Manual Method

20. Special achievements if any : -

21. Brief description of the deposit geology : The Mine falls under Narji Limestone substage of Jammalamadugu series in Kurnool system. The beds strike NW-SE and dip at 1° to 5° towards NE.

Description of the machinery deployed:

S. No.	Equipment	Make	Model	Capacity	Numbers
1	Excavators	L&T Poclain	CKD 300	3.7 M^3	04
		Komatsu	WA-380	3.0 M^3	01
2	Dumpers	HM BEML BEML CAT	1035 N BH-35 BH-35-2 770-G	35 Ts	06 02 01 01
3	Drills	Atlas Copco,	BVB 25	115 Dia	02
4	Compressors ICM-260	CP Atlas Copco	CPS 550 HP XAHS - 350	550 CFM 350 CFM	01 01
5	Dozer	BEML	D-80	212 HP	01
6	Water Tanker	TATA	LPT-1613	10 KL	01
7	Explosive Van	TATA	LPT-709	3 MT	01
8	Mobile Service Van	TATA	LPT-1109	130 hp	01
9	Tractor	HMT	5911	50 hp	01

MINE RESUME

Name & Location of the Mine	: NIDUZUVVI LIMESTONE MINE M/s. The India Cements Ltd, Yerraguntla, YSR Kadapa Dist., A.P – 516 309.
Name of the Mineral	: LIMESTONE
Name of the Owner	: Ms. LAKSHMI APARNA SREEKUMAR
Name of the Agent	: SRI M. RAM SINGH
Agent Phone Number	: 08563-275158.
Agent Mail ID	: ramsingh.m@ indiacements.co.in
Name of the Manager	: SRI K.RAMI REDDY
Manager Phone Number	: 9491035712
Manager Mail ID	: ygl_mines@indiacements.co.in, ramireddy.k@indiacements.co.in
Postal Address	: M/s. The India Cements Ltd, Yerraguntla, YSR Kadapa Dist., A.P – 516 309.
Extent of Mining Lease in Hectares	: 335.06 Ha.
Date of Opening of Mine	: 11-01-1979
Total Reserves	: 95.78 Million Tonnes
Production during 2017-18	: 5, 32,500 Tonnes
Stripping Ratio	: 1 : 0.02
Powder Factor	: 10.00
Productivity (OMS)	: 70.5 Tonnes
No. of Persons employed	: 25
No. of Shifts operated	: 1 (General shift)
Mine is operated by Mechanized/ Semi-Mechanized/Manual Method	: MECHANIZED OPERATIONS
Special Achievements if any	: --

Description of Machinery deployed :

Sl. No	Name of the Equipment	Make	Model	Capacity	Numbers
1	Poclain (Back hoe)	L&T Komatsu	PC-450 LC-7	2.6 Cu.M	1
2	Dumpers	Hindustan	1035	35 MT.	2
	Dumper	BEML	BH 35-2	35 MT.	1
3	Drill	Atlas Copco	LM-100	4 1/2″ (115 mm)	1
4	Compressor	Atlas Copco	XAH 210 Cud.	465 cfm	1
5	Explosive van	TATA	LPT 909 EX2/34	07 Tonnes	1
6	Water Tanker	TATA	LPT 1613/42	10 KL	1
7	Service Van	TATA	ELGI	5 Tonne	1
8	Dewatering Pumps	KSB	Submersible	33 H.P	1
		KSB	Submersible	15 H.P	1
		KSB	Submersible	10 H.P	1
9	Mahindra Jeep	Mahindra	Bolero SLX	62 H.P	1
10	Mahindra Jeep	Mahindra	Bolero Camper	62 H.P	1

<u>Brief description of Geology of Deposit</u> :

The Mining lease area can be located on Survey of India Topo sheet no. 57 J/6 and J/10, bounded by Latitudes $14^{0}37'47.74''$ & $14^{0}39'01.74''$ and Longitudes $78^{0}29'34.14''$ & $78^{0}31'14.83''$. Mine is accessible from Yerraguntla Railway station of S.C.Rly. Division over a distance of about 3 Kms. Mining lease area is a gently undulating terrain surrounded by hillocks of more resistant rocks like quartzites and sandstones on the southern and western sides. The plains occupy comparatively softer rocks like limestone and shale. The area is situated in the south centre of Cuddapah basin. The limestone belongs to Jammalamadugu series of Kurnool system and is referred to as the Narji Limestone. The Kurnool is considered equivalent to the Semri Series of the Vindhyan System and Narji limestone may be roughly referable to the Kajrahat Limestone in the Sone Valley.

SANGAMKALAN LIMESTONE MINE
M/s THE INDIA CEMENTS LIMITED
MALKAPUR, TANDUR

MINES RESUME

Name & Location of the Mine	: Sangamkalan Limestone Mine, Sangamkalan, Post-Malkapur
Name of the Mineral	: Limestone
Name of the owner	: Smt. Lakshmi Aparna Sreekumar
Name of the Agent	: Sri A. Subash Chandra Bose
Agent phone number	: 08411-242301, 242247
Agent mail ID	: bose@indiacements.co.in
Name of the Manager	: Sri T.Mallikarjun Reddy
Manager phone number	: 7288877344
Manager mail ID	: mallikarjunreddy.t@indiacements.co.in
Postal Address of the Mine	: Sangamkalan Limestone Mine Works :Malkapur, Tandur (Mandal) Vikarabad District, Telangana Pin Code : 501 158
Extent of Mining Lease	: 244.52 Hect.
Date of opening of the Mine	: 15.10.1998
Total Reserves as on 1.4.2018	: 180.71 MT
Production 2017-18	: 2.41 million MTs
Productivity (OMS)	: 118
No. of persons employed	: 65
No. of Shifts operated	: 2
Mine is operated by Mechanized / semi-Mechanized/manual method	: Mechanized mines

Brief description of the deposit geology :

The Sangamkalan Limestone Mine is situated in Sangamkalan village, Tandur (Mandal), Vikarabad District, Telangana. The Mine is the captive source of Limestone for the Cement Plant of M/s. The India Cements Limited, Malkapur Works. The Mine lease area falls under Survey of India Topo Sheet No. 56G/7 (Scale: 1:50,000). This mining lease area is bounded by North Latitudes 17 20′ 00″ to 17 21′ 30″ and East Longitudes of 77 27′ 45″ to 70 29′ 00″. The lease hold area belongs to Shahabad formation of Sedam Group of Bhima basin. The Lithological sequence of the area is Variegated

Siliceous Limestone, Grey Limestone and Purple Argillaceous Limestone. The general strike of the deposit is NE – SW and its dip is less than 5 degrees towards South East.

LIST OF MINING MACHINERY

Type of Machinery	Capacity of Each Unit	No. of Units	Model	HP of each Unit
Excavators				
VOLVO : 240	1.10 Cu,M	01	D7DEBE 2	180 HP
Hyundai: 340	1.24 Cu.M	02	EM 15525	247HP
			D7D EDE 2	
VOLVO : 360	2.20 Cu.M	01	E 13449, E13041	247 HP
			Engine No. 639243	
Dumper & Tippers				
BHARATH BENZ	25 Tonnes	14	2528 C	280 HP
Air Compressors	450 CFM	02	Atlas Copco-XAH 210	200 HP
Dozer SD 16		01	CAT	280 HP
Crawler Drill	115 mm Dia	02	Atlas Copco ROC 203	320 HP
			CM 341 Ingersoll-Rand 341	
Mobile Lighting Towers	5 KW,Diesel			
Akshaya Patra 43kw	Genenerater	02	10kw Escorts G n Set-G-30	250 HP
Ingersoll-Rand	Diesel	01	5kw	80HP
Powerol	Diesel	01	5kVA	8.2 bhp
Water Tanker	8 KL	01	Ashok Leyland	110 HP
	12 KL	01	Ashok Leyland	110 HP
Explosive Van	2.605 t	01	Swaraj Mazda	110 HP

KARANKOTE LIMESTONE MINES
M/s. CEMENT CORPORATION OF INDIA LIMITED
TANDUR CEMENT FACTORY

Technical Information

1. Name of the Mine	::	Karankote Limestone Mine
Name of the Registered Company	::	M/s Cement Corporation of India
Postal Address of the Mine		Limited , Tandur Cement Factory, Karankote , Vikarabad Distt , (T.S) Pin – 501158
2. Name of the Owner	::	Sri. B.V.N Prasad
Name of the Agent	::	Sri. B. M. Mahana
Name of the Manager	::	Sri P.K.Sinha
3.Mineral worked	::	Limestone and natural clay
Number of Mining Leases	::	01
Extent of Mining Leases in Hectares	::	631.587 Hectares
Date of Opening of Mine	::	24/10/1983
4.Mineral Production in Million Tonnes		
2015-2016	::	947375
2016-2017	::	800000
2017-2018	::	721000
5. Overburden/Waste Handling in million tones		
2015-2016	::	52125
2016-2017	::	39525
2017-2018	::	38050

6. Deployment of Mining Machineries

S.No	Name of the Equipment	Model	Num bers	Capacity
1.	L&T Poclain Excavator	CK 300	1	3.7 m^3
2.	BEML Excavator	PC 300	1	1.8 m^3
3.	L&T Komatsu	300	3	2.7 m^3
4.	BEML Dumper	LW-35	2	380 hp
5.	Tata Bharath Benz Dumper	LW-30	8	110 hp
6.	Dozer	D-155	1	45 hp
7.	Explosive Van	Ashok Leyland	1	10 tonnes
8.	Service Van	Ashok Leyland	1	------
9.	IR-Drill Compressor 4 inch dia	SD-1012 C	1	12.75 cfm
10	Water Tanker	Hindustan	1	10,000 liters

Karankote limestone mines is captive limestone mine of M/s.CCI Limited, Tandur Cement Factory which is located approximately 2.0 Kms North of the Village Karankote in the Tandur Taluk of Vikarabad District, Telangana. The Mine lies about 20 Kms away by road to the North-West of Tandur Town. The nearest Railway Station is Tandur which is approximately of South Central Railway. The area falls under the Survey of India Topo Sheet no: 56G/7 having Latitude 17 degree 19 minutes, East and longitude 77 degrees 28 minutes North.

The total Mining Lease Area is 613.587 hectares. The Limestone beds belongs to Bhima series. The limestone beds are generally horizontal with low dips of 4 degrees to 5 degrees observed towards West and South West.

The Mining Lease Area is generally flat with gentle slope towards South and South West. The Northern most part of lease area forms a small hillock with maximum of 477 meter. R.L. The drainage of the area is regulated by mullamari stream and Kagna River flowing South of Mining Lease Area. The average ground level near the limestone quarry is around 455 MRL.

The Mine is being worked by mechanized open-cast method by using BEML and L&T Hydraulic Excavators with 35 tones dumpers, dozer, DTH Drills, Portable Compressor, Mobile Service Van, Water Tanker etc. The mining operation consist of removal of about 1 meter thick over burden and exploitation of limestone from 3 limestone benches having height in the range of 5-8.5 meters.

The entire area under the mining lease is covered by black cotton soil having an average thickness of 1 meter. The soil capping is being dozed, transported and stacked in the top soil dump which is located in the non-mineralized area of the lease. Top soil shall be utilized as and when the final pit limit of the deposit is reached for reclamation and rehabilitation of the mined out area. Extensive tree plantation has been taken in the inactive portion of the soil dump. Flaggy limestone encountered in the third bench consist of sub-grade mineral and by having in-pit blending with second bench high-grade limestone, sub-grade limestone is being utilized gainfully in the cement manufacturing process.

There is no wastage of mineral at our mines. The mineral which were excavated being utilized fully for final product. The water encountered in the Mines is being channeled towards sump which is situated on the dip side of the mine working. The water is being stored in the sump and gainfully utilized for dust suppression, water sprinkling of roads by water tanker, watering of afforested plants and used for cooling water requirement of the plant Saplings have been planted in the mining lease area and out side the mining lease area; thereby transforming the erstwhile rocky and barren lands into beautiful green belts.

Penna Cement Industries Limited::Tandur.

MINES RESUME

Name & Location of the Mine	: Ogipur Limestone Mine
Name of the Mineral	: Limestone
Name of the Owner	:D.Lakshmi Kantham Lakshmi Nivas,705,Road No-3, Banjara Hills,Hyderabad-500034. Mail-Id :dlkantham@pennacement.com
Name of the Agent	: P.Vasudeva Reddy Belkatur(v),Tandur(M),Vikarabad (Dt).
Agent Phone Number	: 7997994248
Agent Mail ID	: vasudevareddy.p@pennacement.com
Name of the Manager	: C.Venkata Ramanaiah
Manager Phone Number	: 8096093332
Manager Mail ID	:ramanaiah.cv@pennacement.com
Postal Address	: Ogipur (V),Tandur(M),Vikarabad (D)-501158
Extent of Mining Lease in Hectares	: 221.92Ha
Date of Opening of Mine	: 15/03/2010
Total Reserves	: 144 Million Tons
Production during 2016	: 1231848 MT
Stripping Ratio	: 1:0.08
No. of Persons employed	: 43
No. of shifts operated	: 1
Mine is operated by Mechanized/Semi-Mechanized/Manual Method	: Mechanized

1.Description of Machinery

S.No.	Equipment	Make	Model	Capacity	Numbers
1	Excavator	Tata Hitachi	EX-1200-5D	$5.9M^3$	1
2	Dumpers	BEML	BH 50 M-1	55 Ton	5
3	Revathi Drill	Revathi	C 60 H	150mm	1
4	Dozer	BEML	BD- 155		1
5	Backhoe	Tata Hitachi	EX- 350	$1.8\ m^3$	1
6	Zaxis-450-LCH	Hitachi	450	$2.6\ m^3$	1
7	Water tanker	TATA	2515	12000 KL	1
8	Explosive Van	Eicher	Ex turbo BSII	4Tons	1
9	Mobile service van	TATA	1215	25 Tons	1
10	Pick-up Van	TATA	(Winger)	10	1

2.Brief Description

The Ogipur Limestone Mine, extent 221.92 Ha situated at Sy.No – 73,76 to 95, 107 to 127 of Ogipur village, Tandur Mandal, Vikarabad District of Telangana State. The lease area is bounded by latitudes N 17^{0}18'00" and N 17^{0}18'55" and longitudes E 77^{0}27'30" and E 77^{0}28'00" in the survey of India Topo sheet no's 56 G/7 and 56 G/11.

The lease area is located at a distance of 15 Km NW of Tandur town, Ogipur village lies 1.5 Km south of the subject area. Tandur is an important town in Vikarabad district of Telangana. The black topped and partial CC road from Tandur to chatrasala village via Ogipur, 22 Km long passes through villages such as Belkatur and Karankote. The State boundary between Telangana and Karnataka cuts across the road leading to Chatrasala about 2 Km east of Chatrasala and 3 Km west of Karankote. Nearest railway station is Tandur of South Central Railway. The mining operations commenced on 15/03/2010.The lease is valid 50 Years up to 27.08.2058

3.GEOLOGY

The Ogipur Limestone Mine (221.92 Ha) forms a part of the Bhima basin of Precambrian (upper preterozoic) age. It is located due south of Malkapur. The limestone of Bhima basin occupies an area of about 2000 Sq.Km. The Shahabad formation main repository of limestone is exposed in eastern part of the Bhima basin. Its stratigraphic thickness is reported as 75 m. The said lease area has total mineable reserves of 131.71 million tonnes.The mine has EC capacity of 2.3 million tonnes of limestone per annum. The entire lease area is non-forest and revenue land.

M/S SRIKALAHASTHI PIPES LIMITED

THIPPALUR LIME STONE MINE

MINE RESUME

1) NAME & LOCATION OF THE MINE	:	Thippalur Limestone Mine Thippalur (Village), Sunkesula (Post) Yerraguntla (Mandal), Y.S.R. Dist., A.P.- 516 309
2) NAME OF THE MINERAL	:	Lime stone (Cement grade)
3) NAME OF THE OWNER	:	M/s Srikalahasthi Pipes Ltd.
4) NAME OF THE AGENT	:	Sri L.S. Suri Babu
5) AGENT PHONE NO.	:	Cell No. 98496 34978
6) AGENT MAIL ID	:	lssuribabu@srikalahasthipipes.com
7) NAME OF THE MANAGER	:	P. Bhaskar Reddy
8) MANAGER PHONE NO.	:	Cell No. 99896 23752
9) MANAGER MAIL ID	:	pbreddy53@gmail.com
10) POSTAL ADDRESS	:	Thippalur (V), Sunkesula (Po), Yerraguntla (Mandal) Y.S.R. Dist., A.P.– 516 309.
11) EXTENT OF MINING LEASE IN HECT.	:	17.688 Hect.
12) DATE OF OPENING OF MINE	:	07-12-2001
13) TOTAL RESERVES	:	45,97,516 Tons
14) PRODUCION DURING 2017	:	67,700 Tons
15) SPRIPPING RATIO	:	1 : 0.1
16) PRODUCTIVITY (OMS)	:	12.78 Tons
17) NO. OF PERSONS EMPLOYED	:	18
18) NO. OF SHIFTS OPERATED	:	General shift
19) MINE IS OPERATED BY MECHANIZED/ SEMI MECHANIZED/ MANUAL METHOD	:	Medium Large - Mechanized

BRIEF DESCRIPTION OF GEOLOGY OF DEPOSIT:

The lithological formations exposed in the ML area are top soil and Limestone only. The entire area is covered with 0.5 to 1m thick soil cover and followed by massive limestone. These Limestone formations belongs to Narji stage of Kurnool group. The trend of the formations is almost East- West and dip ranging between 2 to 4 Degrees due north. As per the mining operations and exploration carried out so far in the ML area, the limestone is available with an average thickness of about 28 mts. According to our lab reports the limestone occurring in the ML area Ca o is ranging between 46 to 48 % and Si O2 ranging between 10 to 12 %.

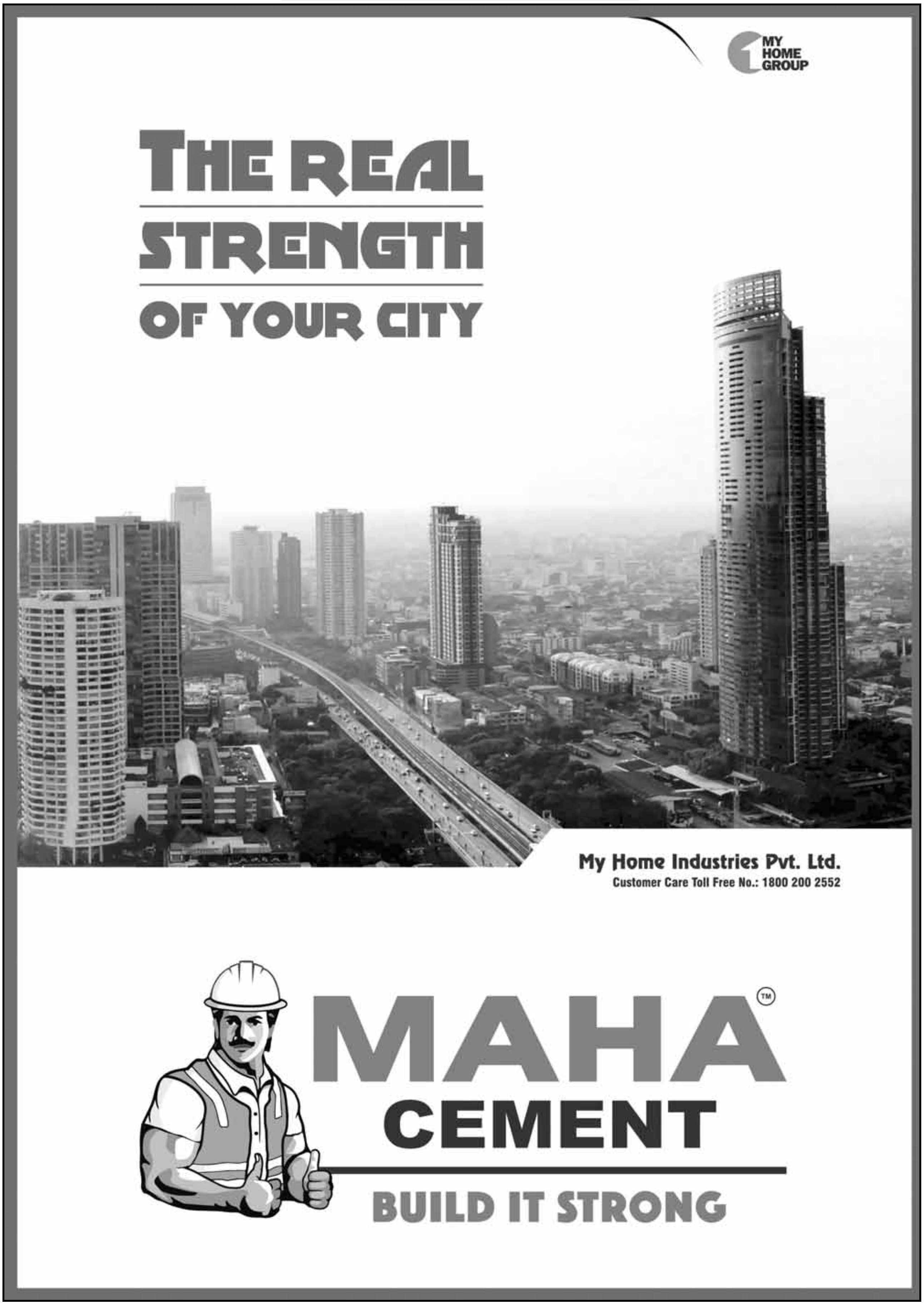
DEPLOYMENT OF MINING MACHINERY:

Type of machinery	Capacity of each unit	No. of Units	H.P.of each unit	Electrical/non electrical (specify)	Used in opencast/ underground(specify)
L&T 210 WITH ROCK BREAKER	$0.9CM^3$	ONE	128	Non-Elec	Open Cast
VT5 Compressor	$7Kgs/CM^2$	ONE	110	Non-Elec	Open Cast
TIPPERS	10MT	TWO	110	Non-Elec	Open Cast
TRACTORS	3MT	ONE	40	Non-Elec	Open Cast
PRIMERY CRUSHER	50MT/Hr	ONE	50	Eletrical	Open Cast
IMPACTOR	40MT/Hr	ONE	40	Eletrical	Open Cast
ATLAS CAPCO WAGANDRILL	115 mm dia	ONE	-	-	Open Cast

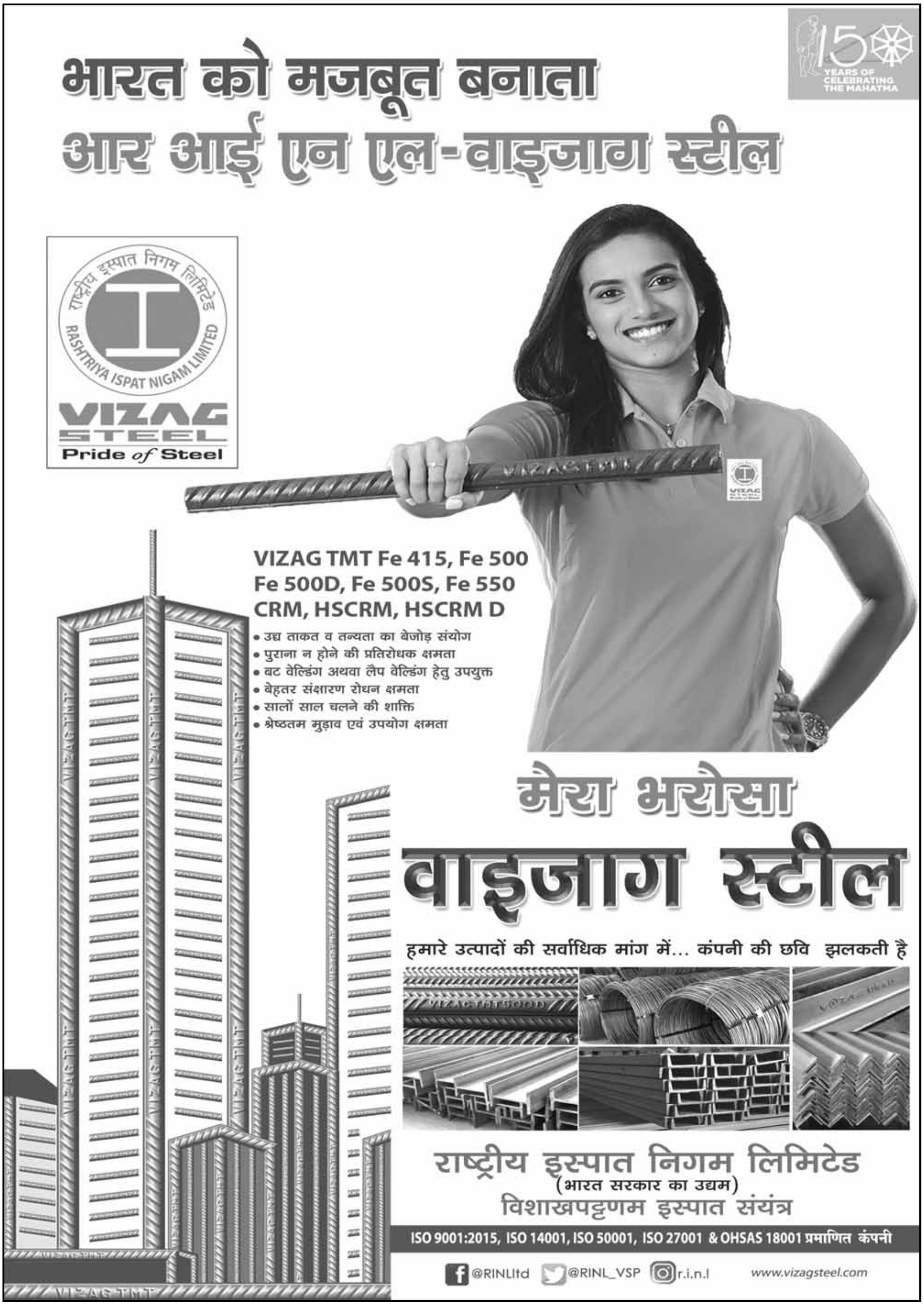
Contributors

Mines Safety Week Observance-2018


Chettinad
ANJANI
SUPER GOLD
CEMENT
www.anjanicement.com
SUCCESSFULLY COMPLETED
CUSTOMER SERVICE
Anjani Portland Cement Ltd
(A Subsidiary of Chettinad Cement Corporation Pvt. Ltd.)


MY HOME GROUP
THE REAL
STRENGTH
OF YOUR CITY
My Home Industries Pvt. Ltd.
Customer Care Toll Free No.: 1800 200 2552
MAHA™
CEMENT
BUILD IT STRONG

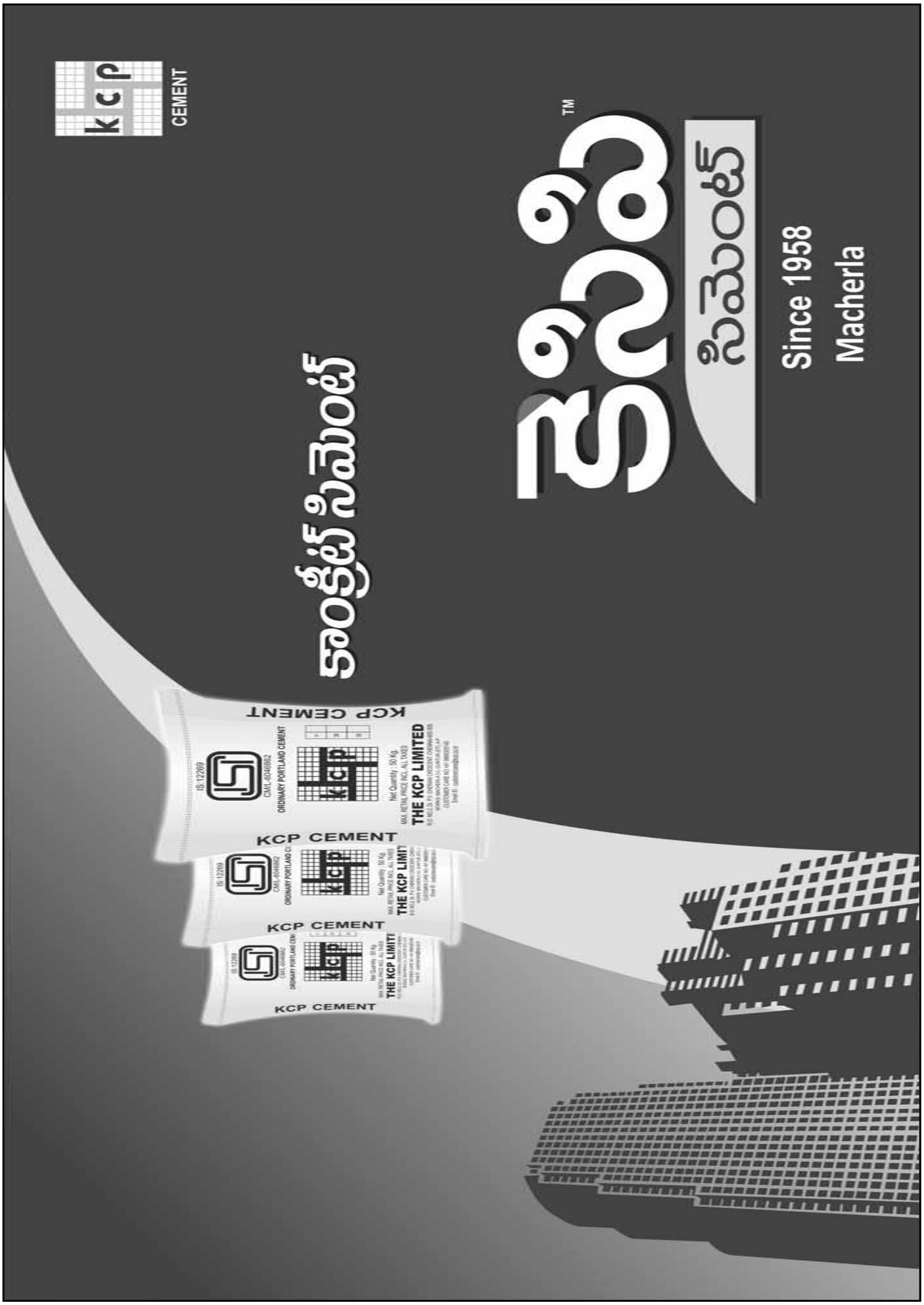
Mines Safety Week Observance-2018

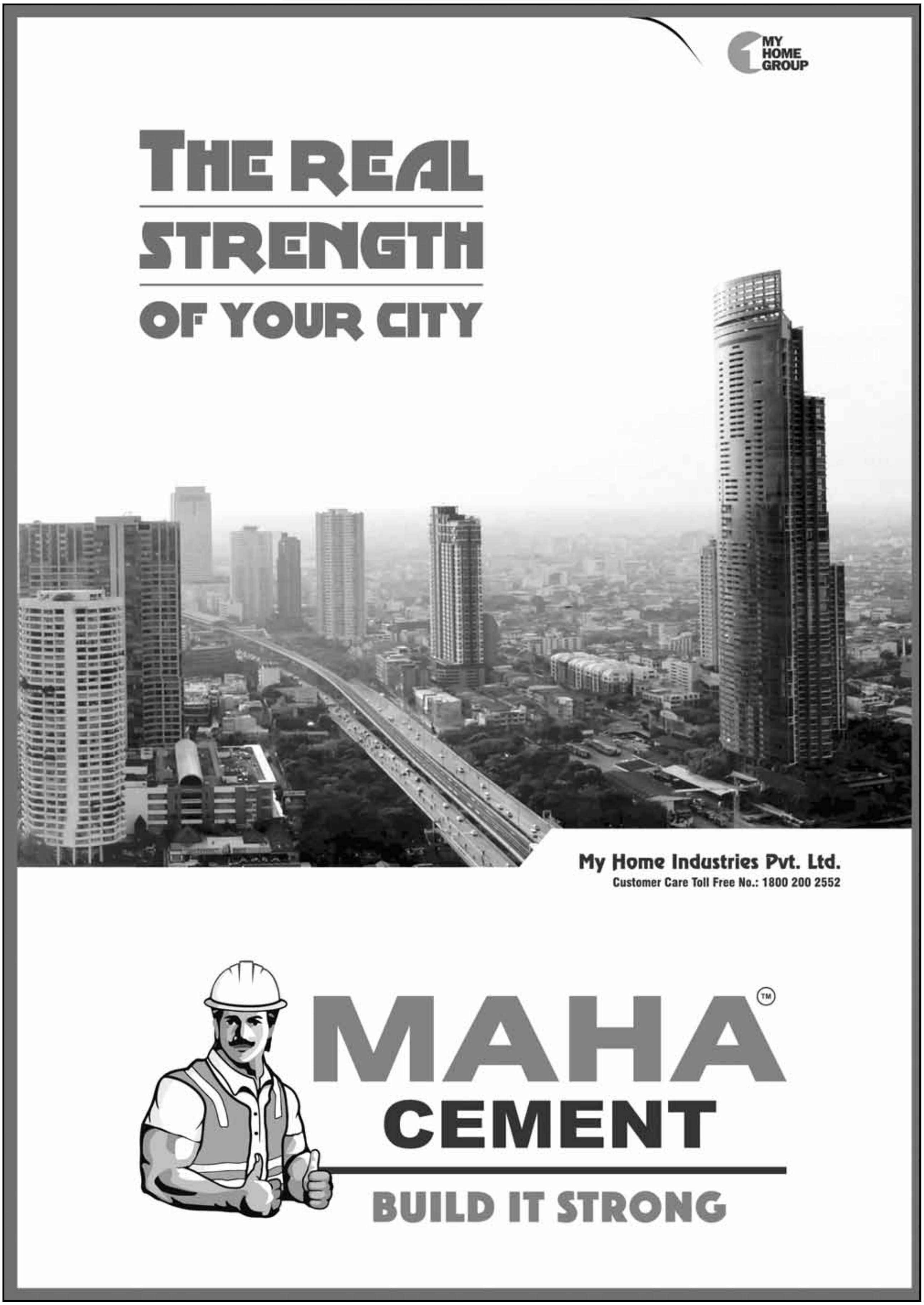


Sankar cement
Coromandel King
Rassi Gold
IS 18001
OHSMS
BUREAU OF INDIAN STANDARDS
IS / ISO 14001
EMS
BUREAU OF INDIAN STANDARDS
IS / ISO 9001
QMS
BUREAU OF INDIAN STANDARDS
AN ISO 9001:2015 CERTIFIED COMPANY
THE INDIA CEMENTS LIMITED
WORKS: VISHNUPURAM, WADAPALLY, NALGONDA – 508 355, PHONE – 08689 - 228580
CORPORATE OFFICE: COROMANDEL TOWERS 93, KARPAGAM AVENUE, RAJA ANNAMALAIPURAM, CHENNAI – 600 028
COMMITTMENT TO ENVIRONMENT WHILE CEMENTING THE NATION
THE INDIA CEMENTS LIMITED
WADAPALLY, NALGONDA-


FROM THE HOUSE OF
India Cements
SANKAR CEMENT
Coromandel SUPER POWER
Coromandel KING
SANKAR SUPER POWER
The India Cements Limited
Yerraguntla

kcp
CEMENT
KCP CEMENT
THE KCP LIMITED
CONCRETE CEMENT
KCP™
CEMENT
Since 1958


kcp
CEMENT
కాంక్రీట్ సిమెంట్
Since 1958
Macherla
KCP CEMENT
THE KCP LIMITED


MY HOME GROUP
THE REAL
STRENGTH
OF YOUR CITY
My Home Industries Pvt. Ltd.
Customer Care Toll Free No.: 1800 200 2552
MAHA™
CEMENT
BUILD IT STRONG

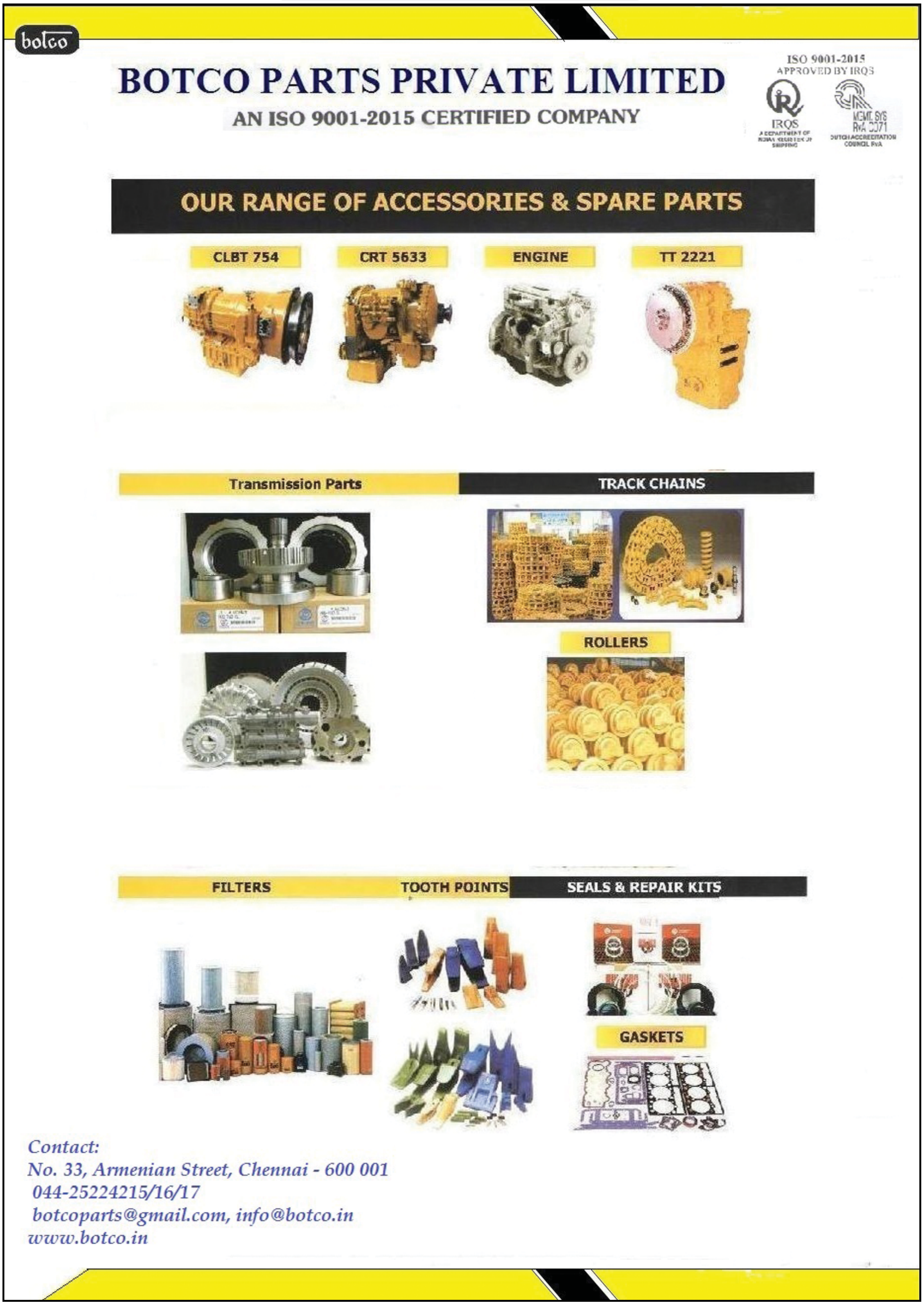

HEIDELBERGCEMENT
Complete Product Portfolio
Zuari Cement
PORTLAND POZZOLANA CEMENT
primo
53 GRADE
Zuari Cement
Zuari Cement
53 GRADE
ORDINARY PORTLAND CEMENT
Zuari Cement
43 GRADE
ORDINARY PORTLAND CEMENT
Zuari Cement
PORTLAND SLAG CEMENT
mycempower
mycem
ಮೈಸೆಮ್
HEIDELBERGCEMENT
माइसेम
Zuari Cement
mycem
cement


పటిష్టమైన కట్టడాలకు
విశిష్టమైన సిమెంట్
శ్రీ చక్ర సిమెంట్
శ్రీ చక్ర సిమెంట్
43 శ్రీచక్ర డైమండ్
53 శ్రీచక్ర గోల్డ్
ADMN OFFICE: "Concrete House", 6-3-668/10/66, Durga nagar Colony, punjagutta, HYDERABAD – 500 082
Ph:040-66614633,66612374,Fax:040-23404657,66789434
Email: srichakracement@gmail.com


HEIDELBERGCEMENT
A Brand New Outlook
primo
Zuari Cement
Zuari Cement
Zuari Cement
43 GRADE
Zuari Cement
53 GRADE
Zuari Cement
mycempower
mycem
HEIDELBERGCEMENT
Zuari Cement
mycem
cement

Advertisements

Mines Safety Week Observance-2018


botco
BOTCO PARTS PRIVATE LIMITED
AN ISO 9001-2015 CERTIFIED COMPANY
ISO 9001-2015
APPROVED BY IRQS
IRQS
OUR RANGE OF ACCESSORIES & SPARE PARTS
CLBT 754
CRT 5633
ENGINE
TT 2221
Transmission Parts
TRACK CHAINS
ROLLERS
FILTERS
TOOTH POINTS
SEALS & REPAIR KITS
GASKETS
Contact:
No. 33, Armenian Street, Chennai - 600 001
044-25224215/16/17
botcoparts@gmail.com, info@botco.in
www.botco.in


CHAKRADHAR
SRI CHAKRADHAR
ENGINEERING PVT. LTD.
KBS
NABCB
QM-032
AN ISO 9001 : 2008 Certified Company
A Trusted Name in Manufacturing & Supply of
High & Low Pressure Hydraulic Hose & Hose Assemblies
Authorised Distributors / Dealers for
manuli RUBBER INDUSTRIES
Gates
SS & MS Braided, Teflon Hose Assemblies
Industrial Hoses viz. Rock Drill, Fly Ash, Steam, Petrol, Welding, Chemical, Sand Blast, Carbon Free & Fire Fighting Hoses etc.
Hose End Fittings, Ermato Fittings, Flanges, Elbows, Tees & Pipe Clamps etc.
General Engineering Works
STAUFF Pipe Clamps, Pressure Gauges, Minimess Hoses, Filters, Accumulators, Quick Release Couplers, Ball Valves, Diagtronics, Laser Particle Counter / Monitor & Electronic Accessories etc.
Authorised Dealer for STAUFF®
REiL/DELCO REMY
Heavy Duty Electrical Starter Motors & Alternators
Authorised Service & Spares Distributor for REiL
CASAPPA PUMPS
M+S HYDRAULIC Steering Units
intermot Motors & Accessories etc.
HEMM Spares viz. Teeth Points, Teeth Adaptors, Under Carriage Parts, 'O' Rings, Seals & Seal Kits etc.
Stainless Steel Hose & Pipe Clamps
Approved by DGMS for Mining Hoses
Impulse Tested at DRDO, Dighi, Pune & BEML, KGF
EXPORTERS & IMPORTERS
4-7-347, Beside APSEB Sub-Station, Prakash Nagar, KHAMMAM 507 003. Telangana State.
Ph: 256477, 256860 Fax: 08742-257358 Cell: 94406 22075
B.O : Hyderabad : Cell : 94406 22069
E-mail: chakradharengineering@gmail.com
Website: www.chakradharengineering.com


ENGINE
Genuine Alternative Engine Transmission Parts & Filters For CATTERPILLAR, CUMMINS, H.M & KOMATSU to meet your engine's demand and lower your repair costs
Performance Parts - to work and wear as a system to deliver strength and durability
Warranted low cost repair option
Off-the-shelf component availability
For Information on Comprehensive service and support call or visit :
ICPS
Int-A-Cat Parts & Service (South East) Pvt. Ltd.
Head Office : # 6-3-448, 1st Floor, Above Bridgestone, Punjagutta, Hyderabad - 500 082. T.S.
Tel: # 040 - 65699661 / 23352831, Fax # 040 - 23352805, Email: info@icpshyd.com, Website: www.icpshyd.com

myport
Safety. Security. Energy Saving

MY PORT SERVICES INDIA

Leaders in Supply and Installation of Safety and advance warning systems for Mining sectors
All our products are either approved or comply with the requirement specified by DGMS









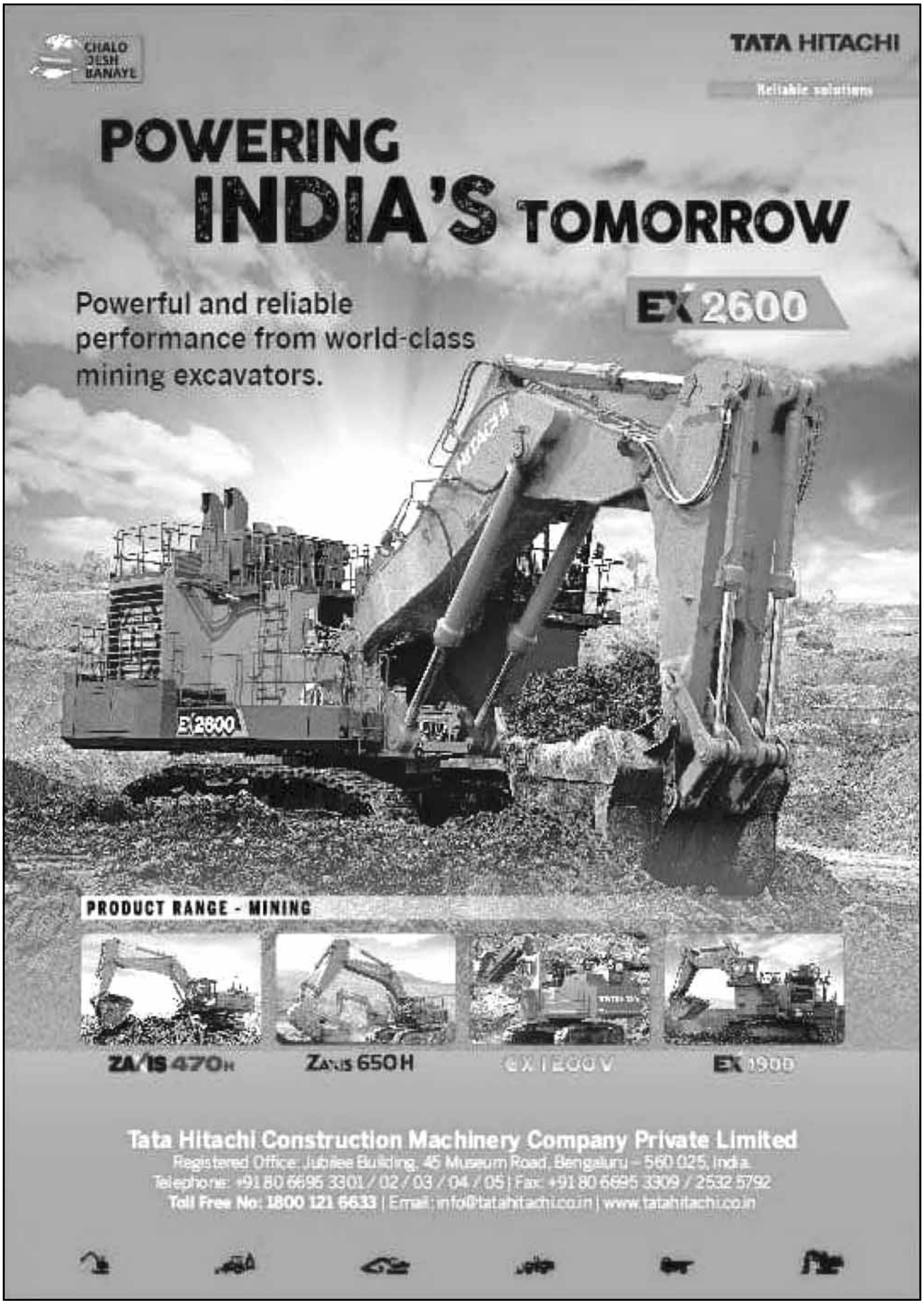
LIST OF PRODUCTS

- Rear View Camera system
- Audio Visual Alarm
- Driver Fatigue Monitoring system
- Reverse Alarm
- Seat Belt reminder system
- Safety Mirrors
- LED Beacons
- Fuel Management system
- Tire pressure monitoring system
- Fire suppression
- Battery cutoff switches
- LED Work light

For any further queries please contact
My Port Services India
C-603, Parivartan Chs, Vallabh Baug lane,
Ghatkopar East, Mumbai – 400075
Mr. Vipul Vora
CEO
+91 9821168333 / +91 22 25067553

Mines Safety Week Observance-2018

Mines Safety Week Observance-2018



Trade Test Results-2018

MINES SAFETY AND PRODUCTIVITY COUNCIL-2018
TRADE TEST RESULTS
ZONE-1 GROUP "A"

Sl.No	Trade Test	1st Prize	2nd Prize	3rd Prize
1	Drilling	S K Hussain, M/s. My Home Industries Ltd.	K Santaiah, M/s ICL Lakshmipuram	D. RamBabu, M/s. Zuari Cements Ltd.
2	Blasting	P. Yedukundalu, M/s Sagar Cements Ltd.	D. Saidhi Reddy, M/s Priya Cements Ltd.	V. Ramarao, M/s NCL Industries Ltd., Gundlapalli Kondalu Rao, M/s. Zuari Cements Ltd.
3	Mine Mate	L C S Reddy, M/s. Zuari Cements Ltd.	K Raju, M/s. Rain Cements Ltd. Ramapuram	A Ravindar Reddy, M/s. My Home Industries Ltd.
4	Shovel operator	B Srinu, M/s. My Home Industries Ltd.	P Bhima Raju, M/s ICL Lakshmipuram	SK Saidulu, M/s. Deccan Cements Ltd.
5	Dumper/Tipper Operator	S K Munaf, M/s Penna Cement Industries Ltd.	N Srinivasa Reddy, M/s Sagar Cements Ltd.	G. Mahendhar Reddy, M/s. Deccan Cements Ltd.
6	Auto-Electrician	K Srinivasulu, M/s. Rain Cements Ltd. Ramapuram	Y Ganesh, M/s. Deccan Cements Ltd.	S Lachi Reddy, M/s Sagar Cements Ltd.
7	Electrician	V Vigneswara Rao, M/s. Rain Cements Ltd. Ramapuram	M V Rama Raju, M/s. Anjani Portland Cements Ltd.	SK Jani Basha, M/s Sagar Cements Ltd.
8	Foreman Quiz	A N Srinivasa Rao, M/s. Rain Cements Ltd. Ramapuram	Y Rajesh Reddy, M/s. Anjanai Portland Cement ltd	D Hemanth, M/s. My Home Industries Ltd.
9	Diesel Mechanic	A Adi Narayana, M/s NCL Industries Ltd., Gundlapalli	O. Edukondalu, M/s India Cement Ltd.	Tirumala Reddy, M/s Sagar Cements Ltd.
10	Welder	A Bapi Raju, M/s ICL Lakshmipuram	A Seshagiri Rao, M/s. Rain Cements Ltd. Ramapuram	I Srinivas, M/s. My Home Industries Ltd.
11	Crusher Operator	P. Amrutham, M/s. My Home Industries Ltd.	D. Jaggaraju, M/s NCL Industries Ltd., Gundlapalli	SK Hasan, M/s ICL Lakshmipuram M. Anjaiah, M/s. Deccan Cements Ltd.
12	First Aid	K Raju ANS Srinivasa Rao A Jaggannadha Reddy C N Mahendra Reddy M/s. Rain Cements Ltd. Ramapuram	T V Venkatanarayana A Papaiah P Ravindra Varma A Chandra Sekhar M/s. My Home Industries Ltd.	B V Subba Raju M Laxman Reddy E A G Verma N Siva Naga Raju M/s. Zuari Cements Ltd.

MINES SAFETY AND PRODUCTIVITY COUNCIL-2018
TRADE TEST RESULTS
ZONE-1 GROUP "B"

Sl.No	Trade Test	1st Prize	2nd Prize	3rd Prize
1	Drilling	P Lingaiah, M/s Sagar Cements Ltd.-2	B Anjaneyulu, M/s My Home Industries Ltd.	V. Koteswara Rao, M/s Keerthi Industries Ltd.
2	Blasting	V. Narasimha Rao, M/s. Keerthi Industries Ltd.	Brahma Reddy, M/s My Home Industries Ltd.	V. Krishna, M/s Sagar Cements Ltd.-2
3	Mine Mate	B Prabhakar Reddy, M/s Sagar Cements Ltd.-2	K Ravi Chandra, M/s Keerthi Industries Ltd.	N Rama Krishna, M/s My Home Industries Ltd.
4	Shovel operator	P. Sudheer Kumar, M/s My Home Industries Ltd.	K Venkateswarlu, M/s Sagar Cements Ltd.-2	Sk. Abdul Raheem, M/s Keerthi Industries Ltd.
5	Dumper/Tipper Operator	G Mar Reddy, M/s Sagar Cements Ltd.-2	Melbin Kullu, M/s My Home Industries Ltd.	V Srinu, M/s Keerthi Industries Ltd.
6	Auto-Electrician	SK Kasim Saheb, M/s Grey Gold Cements Ltd.	B Siva Krishna Chari, M/s Keerthi Industries Ltd.	K Saidulu, M/s Sagar Cements Ltd.-2
7	Electrician	K Nagendra Babu, M/s Keerthi Industries Ltd.	S Lakshmikanth, M/s. My Home Industries Pvt. Ltd	Brahama Reddy, M/s Sagar Cements Ltd.
8	Foreman Quiz	K Maheswara Reddy, M/s. M/s. My Home Industries Pvt. Ltd	K. Baji, M/s Sagar Cements Ltd.-2	B Bala Siva, M/s Keerthi Industries Ltd.
9	Diesel Mechanic	TVB Subramanyam, M/s Sagar Cements Ltd.-2	G. Nageswara Rao, M/s Keerthi Industries Ltd.	D. Suneel, M/s My Home Industries Ltd.
10	Welder	V Narsimhachari, M/s Keerthi Industries Ltd.	P Ramakrishna, M/s Sagar Cements Ltd.	I Narasinha Rao, M/s Grey Gold Cements Ltd.
11	Crusher Operator	M. Srinivasa Rao, M/s Keerthi Industries Ltd.	P. Sanjeeva Reddy, M/s Sagar Cements Ltd.-2	G. Narasimha Rao, M/s Grey Gold Cements Ltd.
12	First Aid	G Konda Reddy K Maheswar Reddy K Narasimha Reddy T V Brahamiah M/s. My Home Industries Pvt. Ltd	N Shiva Nagaraju G Durga Rao B V Raju B Prabhakar Reddy M/s Sagar Cements Ltd.-2	B Bala Siva K Ravi Chandra R Damodar P Thirumalesh Reddy M/s Keerthi Industries Ltd.

MINES SAFETY AND PRODUCTIVITY COUNCIL-2018
TRADE TEST RESULTS
ZONE-2 GROUP "A"

Sl.No	Trade Test	1st Prize	2nd Prize	3rd Prize
1	Drilling	Orsu Yedukondalu, M/s UltraTech Cement Ltd., Budawada	M. Ram Babu, M/s Parasakthi Cements Ltd., Jettipalem	Indla Ram, M/s Orient cements Ltd., Devapur
2	Blasting	G Venkateswara Rao, M/s Ramco Cements Ltd., Jaggaiahpeta	M Venkata Reddy, M/s UltraTech Cement Ltd., Budawada	K Shoury, M/s Bhavya Cements Ltd., Tangeda
3	Mine Mate	Bhagawan Naik, M/s Ramco Cements Ltd., Ravirala	Ajoy Kr. Sinha, M/s UltraTech Cement Ltd., Budawada	P Srinivasalu, M/s Parasakthi Cements Ltd., jettipalem
4	Shovel operator	R Shankar Kumar, M/s Parasakti Cement Ltd., Jettipalem	M. Srinivasa Kumar, M/s Bhavya Cement Ltd., Tangeda	K Appa Rao Naidu, M/s UltraTech Cement Ltd., Budawada N Yedukondalu, M/s. Jaypee Andhra Cements, Guntur
5	Dumper/ Tipper Operator	B.Sadanandam, M/s Kesoram Cements Ltd. Basanthnagar	P. Veera Reddy, M/s Parasakti Cements Ltd., jettipalem	M. Kistaswamy, M/s orient Cements Ltd., Devapur
6	Auto-Electrician	K Bala Peru, M/s UltraTech Cement Ltd., Budawada	K Bala Chandra Rao, M/s Bhavya Cement Ltd., Tangeda	P Basu Khan, M/s Parasakthi Cements Ltd., jettipalem
7	Electrician	R Hanumantha Rao, M/s Ramco Cements Ltd.,	A Raja Sekhar, M/s. KCP Cements Ltd. Mukthyala	V. Rajashekhar Reddy, Jaypee Andhra Cements, Guntur
8	Foreman Quiz	K Rama Krishna, M/s. KCP Cements Ltd. Mukthyala	B. Venkataswarulu, M/s Parasakti Cements Ltd., jettipalem	T. Radha Krishna, M/s UltraTech Cement Ltd., Budawada
9	Diesel Mechanic	CH. Sekhar, M/s Parasakti Cements Ltd.,	D P Diwedi , M/s UltraTech Cement Ltd., Budawada	MD. Arif, M/s Orient Cements Ltd., Devapur V SambaSiva Rao, M/s. KCP Cements Ltd. Mukthyala
10	Welder	T Manohar, M/s Parasakthi Cements Ltd., jettipalem	SK Raheem, M/s. KCP Cements Ltd. Mukthyala	P. Pitchaiah, M/s Ramco Cements Ltd.,
11	Crusher Operator	B Shambi Reddy, M/s UltraTech Cement Ltd.	B Bhaskhar, M/s Orient Cements Ltd., Devapur	M Srikanth, M/s Parasakti Cements Ltd., jettipalem
12	First Aid	Jayanthipuram Limestone Mine M/s Ramco Cements Ltd.,	M/s VSP, Jaggayyapeta	M/s. KCP Cements Ltd. Mukthyala

MINES SAFETY AND PRODUCTIVITY COUNCIL-2018
TRADE TEST RESULTS
ZONE-2 GROUP "B"

Sl.No	Trade Test	1st Prize	2nd Prize	3rd Prize
1	Drilling	P Konda Swamy, M/s Kakatiya Cements Ltd., Srinivasanagar	P Murli Krishna Prasad, M/s KCP Ltd., Macherala	S K Saida, M/s. Sri Chakra Cements Ltd., karampudi
2	Blasting	R Gopi Kumar, M/s Hemadri Cements Ltd., Vedadri	S Pothulurayya, M/s Kakatiya Cements Ltd., Jaggaiahpet	V Naina Naik, M/s Sri Chakra Cements Ltd., Karampudi
3	Mine Mate	N Guruvulu, M/s Kakatiya Cements Ltd., Jaggaiahpet	K Venkateswara Rao, M/s KCP Ltd., Macherala	Raja Mohan, M/s Sri Chakra Cements Ltd., Karampudi
4	Shovel operator	K Murli Krishna, M/s. KCP Cements Ltd, Macherala	Shorab Ansari, M/s Sri Chakra Cements Ltd., Karampudi	Nageswar Rao, M/s Hemadri Cements Ltd., Vedadri
5	Dumper/Tipper Operator	--	--	--
6	Auto-Electrician	Masoad Ali, M/s Kakatiya Cements Ltd., Jaggaiahpet	A Balaiah, M/s Sri Chakra Cements Ltd., Karampudi	--
7	Electrician	K Nageswar Rao, M/s Kakatiya Cements Ltd., Jaggaiahpet	V. Venkata Narayana, M/s. KCP Cements Ltd, Macherala	G. Pavan, M/s Sri Chakra Cements Ltd., Karampudi
8	Foreman Quiz	K Mahesh, M/s. KCP Cements Ltd, Macherala	K Nageswara Reddy, M/s Sri Chakra Cements Ltd., Karampudi	K Naga Apparao, M/s Kakatiya Cements Ltd., Jaggaiahpet
9	Diesel Mechanic	P M K Prasad, M/s. KCP Cements Ltd, Macherala	K Srinivasa Reddy, M/s Kakatiya Cements Ltd., Jaggaiahpet	E Ramesh, M/s Hemadri Cements Ltd., Vedadri
10	Welder	K V G Raju, M/s Sri Chakra Cements Ltd., Karampudi	SK. Fareed, M/s Hemadri Cements Ltd., Vedadri	D kataksha Rao, M/s Kakatiya Cements Ltd., Jaggaiahpet
11	Crusher Operator	A Venkateswara Rao, M/s Hemadri Cements Ltd., Vedadri	A Srinivasa Reddy, M/s Kakatiya Cements Ltd., Jaggaiahpet	--
12	First Aid	M/s Kakatiya Cements Ltd., Jaggaiahpet	M/s. KCP Cements Ltd, Macherala	--

MINES SAFETY AND PRODUCTIVITY COUNCIL-2018
TRADE TEST RESULTS
ZONE-3 GROUP "A"

Sl.No	Trade Test	1st Prize	2nd Prize	3rd Prize
1	Drilling	M Muniraj, M/s Zuari Cements Limited, yerraguntla	C Imam Saheb, M/s. India Cements Limited, Yerraguntla	S Vara Prasad, The APMDC Ltd.
2	Blasting	P. Pullaiah, M/s Zuari Cements Limited, yerraguntla	T. Hanumanthu, M/s.Penna Cement, Tandur	M.V. Narasimulu, M/s. APMDC,Mangampet
3	Mine Mate	T Naga Raju, M/s Penna Cements Ltd.,	G Naga Bhushanam, M/s India Cements Ltd., Malkapur	K V Siva Rao, M/s Zuari Cement Ltd., Yerraguntla
4	Shovel Operator	G Y Kondarayudu, M/s Zuari Cement Ltd., Yerraguntla	K Ramakrishna Reddy, M/s. Bharathi Cements Ltd., Nallalingayapalli	V Rami Reddy, M/s. India Cements Limited, Yerraguntla
5	Dumper/Tipper Operator	K V Narayana, M/s India Cements, Chilamkur	B Nagaraju, M/s Zuari Cement Ltd.,	S Akbar Basha, M/s. India Cements Limited, Yerraguntla
6	Auto-Electrician	N.Damodor Reddy, M/s Zuari cements, Yerraguntla	M.Ramanjaneyulu, M/s. India Cements Limited, Yerraguntla	N.Subbaramudu, M/s India Cements, Chilamkur
7	Electrician	T Srinivasa Rao, M/s India Cements, Malkapur	C Mallikarjuna, M/s Zuari cements, Yerraguntla	P Prakash, CCI, Tandur
8	Foreman Quiz	P Sreekanth Reddy, M/s. India Cements Limited, Yerraguntla	V Ramachandra Reddy, M/s. Dalmia Cements Ltd.	Ch. Viswarupa Chary, M/s APMDC, Mangampet A Naga Satyanarayana, M/s India Cements Ltd., Chilamkur
9	Diesel Mechanic	Ullas, M/s.Penna Cement, Tandur	C Narsimhulu, M/s. Bharathi Cements Ltd., Nallalingayapalli	BV Ramana Reddy, M/s India Cements, Chilamkur
10	Welder	B Krishna Reddy, M/s Zuari Cements, Yerraguntla	Jaheer Ahammad, M/s. India Cements Limited, Yerraguntla	S Ramesh Babu, M/s. Bharathi Cements Ltd., Nallalingayapalli
11	Crusher Operator	S Ravindranath Reddy M/s. Dalmia Cements Ltd.	M Subramanyam Reddy M/s Zuari Cements, Yerraguntla	Y Neelakanta Reddy, M/s. India Cements Limited, Yerraguntla
12	First Aid	M/s Zuari Cements, Yerraguntla	M/s. APMDC Ltd. ,Mangampet	M/s. Dalmia Cements Ltd.

MINES SAFETY AND PRODUCTIVITY COUNCIL-2018
TRADE TEST RESULTS
ZONE-3 GROUP "B"

Sl.No	Trade Test	1st Prize	2nd Prize	3rd Prize
1	Drilling	N Narasimha Reddy, M/s. Sri Kalahasti Pipe Ltd.,		
2	Blasting	--	--	--
3	Mine Mate	--	--	--
4	Shovel operator	S Venkatesh, M/s. Sri Kalahasti Pipe Ltd.,	--	--
5	Dumper/Tipper Operator	--	K Nagesam, M/s. Sri Kalahasti Pipe Ltd.,	
6	Auto-Electrician	--	--	--
7	Electrician	--	--	--
8	Foreman Quiz	--	--	--
9	Diesel Mechanic	--	--	--
10	Welder	--	--	--
11	Crusher Operator	B Sivanjaneya Reddy M/s. Sri Kalahasti Pipe Ltd.,	--	--

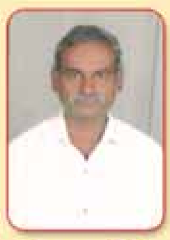
MINES SAFETY AND PRODUCTIVITY COUNCIL-2018
STATE LEVEL TRADE TEST RESULTS

S.No	Trade	1st Prize	2nd Prize	3rd Prize
1	DRILLING	 **M. Muniraj** M/s Zuari Cements Limited, Yerraguntla	 **S K. Hussain** M/s My Home Industries Pvt. Ltd.	 **Orsu Yedukondalu** M/s UltraTech Cement Ltd., Budawada
2	BLASTING	 **G. Venkateswara Rao** M/s Ramco Cements Ltd., Jaggaiahpeta	 **V. Narasimha Rao** M/s Keerthi Industries Ltd.	 **P. Pullaiah** M/s Zuari Cements Limited Yerraguntla
3	MINE MATE	 **N. Bhagavan Naik** M/s Ramco Cements Ltd., Ravirala	 **B. Prabhakar Reddy** M/s Sagar Cements Ltd., - 2	 **T. Naga Raju** M/s Penna Cements Ltd.,
4	SHOVEL OPERATOR	 **B. Srinu** M/s My Home Industries Pvt. Ltd.	 **G. Y. Kondarayudu** M/s Zuari Cement Ltd. Yerraguntla	 **R. Shankar Kumar** M/s Parasakti Cement Ltd. Jettipalem

Support your local Search and Rescue Squad - Get Lost

Mines Safety Week Observance-2018

MINES SAFETY AND PRODUCTIVITY COUNCIL-2018
STATE LEVEL TRADE TEST RESULTS

S.No	Trade	1st Prize	2nd Prize	3rd Prize
5	DUMPER/TIPPER OPERATOR	 **S K. Munaf** M/s Penna Cement Industries Ltd.	 **G. Mar Reddy** M/s Sagar Cements Ltd. -2	 **K. V. Narayana** M/s India Cements Ltd. Chilamkur
6	FOREMAN QUIZ	 **K. Maheswara Reddy** M/s My Home Industries Pvt. Ltd	 **P. Sreekanth Reddy** M/s India Cements Limited Yerranguntla	 **A. N. Srinivasa Rao** M/s Rain Cements Limited Ramapuram
7	ELECTRICIAN	 **V. Vigneswara Rao** M/s Rain Cements Ltd., Ramapuram	 **R. Hanumantha Rao** M/s Ramco Cements Ltd., Jayanthipuram	 **K. Nageswar Rao** M/s Kakatiya Cements Ltd., Jaggaiahpet
8	AUTO ELECTRICIAN	 **K. Bala Peru** M/s UltraTech Cement Ltd., Budawada	 **K. Srinivasulu** M/s Rain Cements Ltd. Ramapuram	 **Masoad Ali** M/s Kakatiya Cements Ltd. Jaggaiahpet

MINES SAFETY AND PRODUCTIVITY COUNCIL-2018
STATE LEVEL TRADE TEST RESULTS

S.No	Trade	1st Prize	2nd Prize	3rd Prize
9	DIESEL MECHANIC	 **Adi Narayana** M/s NCL Industries Ltd., Gundlapalli	 **CH. Sekhar,** M/s Parasakti Cement Ltd.	 **T.V.B. Subramanyam,** M/s Sagar Cements Ltd. -2
10	WELDER	 **B. Krishna Reddy** M/s Zuari Cements Yerraguntla	 **T. Manohar** M/s Parasakthi Cements Ltd., Jettipalem	 **V. Narsimhachari** M/s Keerthi Industries Ltd.
11	CRUSHER OPERATOR	 **B. Shambi Reddy** M/s UltraTech Cements Ltd., Budawada	 **M. Srinivasa Rao** M/s Keerthi Industries Ltd.,	 **A. Venkateswara Rao** M/s Hemadri Cements Ltd., Vedadri

Mines Safety Week Observance-2018

MINES SAFETY AND PRODUCTIVITY COUNCIL-2018
STATE LEVEL TRADE TEST RESULTS

Prize	Yepalamadharam Lime Stone Mine of M/s MY Home Industries Ltd.			
1st	 K. Maheswar Reddy	 G. Konda Reddy	 T.V. Brahmam	 B. Narasimha Reddy
	Rain Limestone Mine of, M/s Rain Cements Ltd.			
2nd	 K. Raju	 A. Jagannadha Reddy	 A.N.S. Srinivas Rao	 C. N. Mahendra Reddy
	Jayanthipuram Limestone Mine of M/s Ramco Cements Ltd.			
2nd	 N. Bhagavan Naik	 N. Subba Reddy	 SD. Karim Basha	 B. Narasimha Reddy

LIST OF HOST COMPANIES FOR SAFETY WEEK CELEBRATIONS SINCE 1985

M/s Raasi Cements Ltd 1985	M/s Andhra Cements Ltd 1986	M/s ACC Mancherial 1987	M/s Madras Cements Ltd 1988
M/s Orient Cements 1989	M/s C.C.I. Tandur 1990	M/s India Cements Ltd., (Chilamkur) 1991	M/s Priyadarshini Cements 1992
M/s Kesoram Cements Ltd 1993	M/s KCP Ltd 1994	M/s VSP, Jaggayyapet 1995	M/s Sri Vishnu Cements Ltd 1996
M/s Zuari Cements Ltd (Yerraguntla) 1997	M/s India Cements Ltd, Yerraguntla 1998	M/s Deccan, kakatiya & Coromonadal Cements Ltd 1999	M/s APMDC Mangampet 2000
M/s NCL, Sagar & Anjani Cements Ltd 2001	M/s My Home Industries Ltd. 2002	M/s Visaka Cement Industries Ltd 2003	M/s Penna Cement Ltd. (Ganeshpahad) 2004
M/s Keerthi Industries & Sri Chakra Cements Ltd. 2005	M/s India Cements Ltd., Vishnupuram 2006	M/s Parasakthi Cement Ltd 2007	M/s Andhra Cements Ltd 2008
M/s Mancherial Cements Company Ltd 2009	M/s Madras Cements Ltd 2010	M/s Orient Cements Ltd., APMDC 2011	M/s CCI Tandur 2012
M/s Rain Cements Ltd. Unit-1, Ramapuram 2013	M/s KCP Ltd 2014	M/s India Cements Ltd (Chilamkur) 2015	M/s My Home Industries Pvt. Ltd, Mellacheruvu 2016
M/s Penna Cements Ltd. Tandur 2017			

2018- M/s UltraTech Cement Limited, Budawada

2019-M/s Bharathi Cement Corporation Limited

2020-M/s. KCP Cements, Muktyala