



तकनीकी पत्रिका विषय-सूची

CURRENT CONTENT

(Technical Journals)

(A Monthly Current Awareness Service from technical journals)

Vol.1, No.1-July 2017

The Central Library, IBM, Nagpur is subscribing the technical journals and also receiving them on complimentary basis on various subjects like Geology, Mining, Mineral Economics etc. These Technical Journals make up an important collection of latest scientific information. The library is rendering Reference Service to its users from these technical Journals. Central Library, IBM provides Current Content Service from these technical journals in the name of "GEM" since 2006 on half yearly basis in print form. To expand this service to the IBM Offices all over India i.e. H.Q., Zonal & Regional Offices and to take a call of time, the Controller General, IBM desired to make this service online on monthly basis. The library staff made efforts to make it successful. This is the 1st issue of this service named **"Current Content- a monthly current awareness service from technical journals", Vol.1, No.1, July 2017**. The online journal "World Metal Statistics" is available for reference in central library upto August 2017.

It will be highly appreciated if the valuable feedback is reciprocated.

Mrs. D. H. Vairagare

Assistant Library & Information Officer



तकनीकी पत्रिका

विषय-सूची

CURRENT

CONTENT

(Technical Journal)

A Monthly Current

Awareness Service

from technical journals

Vol.1, No.1-July

2017

by

IBM CENTRAL

LIBRARY

I N D E X

<u>S.No</u>	<u>Title</u>	<u>Page No</u>
1)	Engineering & Mining Journal	4-5
2)	Industrial Minerals	6-7
3)	Iron & Steel Review	8-9
4)	Journal of the Geological Society of India	10-14
5)	Journal of Mines Metals & Fuels	15
6)	JPC Bulletin	16
7)	Metal Bulletin Magazine	17-18
8)	Mineral Economics	19
9)	Minerals & Metallurgical processing	20
10)	Mining Engineering	21-24
11)	Mining Engineers Journal	25
12)	Mining Magazine	26-27

FEATURES

Keeping Concentrate Shipments Under Control <i>Moving metal concentrates from mine to market can present some operational challenges, especially from an environmental perspective</i>	24
Cashing In On Renewable Energy <i>Costs, unfamiliarity and reliability concerns have kept mines from enthusiastically plugging into renewable energy systems. New technologies, along with more-affordable systems and setups, raise the prospect of RE-sourced dependable power at reasonable prices</i>	32
Peak Gold? Top 10 Gold Miners Process More Ore, Produce Less Gold <i>Despite higher prices and lower costs, world's top producers scramble to get out of debt as output falls</i>	40
Open-pit Mining Conference Offers Solutions for Operators <i>Presentations discuss the latest developments related to truck-shovel mining</i>	46
Size Matters <i>Recent truck launches cater to both ends of the underground haulage spectrum</i>	54
Russian Chemical Company Stalls Commissioning Two Big Potash Mines <i>Market glut, sanctions and technical challenges combine to slow progress and temporarily postpone milestones</i>	56

LEADING DEVELOPMENTS

Goldcorp, Barrick Partner to Develop Gold Projects in Chile.....	4
Russia Suggests OPEC-type Association for Aluminum.....	5
Saskatchewan Tops Fraser Mining Survey.....	5

AROUND THE WORLD

U.S. & Canada: <i>Newest Canadian Diamond Mine Reaches Commercial Production</i>	6
Latin America: <i>Lundin Gold Awards Fruta del Norte Mine Development Contract</i>	12
Africa: <i>Trevali Buying Glencore Interests in Rosh Pinah, Perkoa</i>	14
Asia: <i>Alamos Sees Potential in Turkey</i>	16
Exploration Roundup: <i>Newmont Secures Earn-in Rights to Goldstrike's Plateau Property</i>	18
Europe: <i>Eldorado: Olympias Phase II Commissioning on Track</i>	22



Ausenco designed a containerized system for the Las Bambas mine where custom containers are loaded at the mine and trucked 420 kilometers to a transloading facility. Containers are then placed on trains for the trip to the port where they are discharged to the conventional bulk system for storage and loading onto ships. The final system, commissioned in early 2016, reduced both capital and operating costs by integrating this technology while making use of the existing infrastructure. (Photo: Ausenco)

DEPARTMENTS

Calendar.....	22
Classified Advertisements.....	78
Equipment Gallery.....	74
From the Editor.....	2
Markets.....	80
Operating Strategies.....	62
People.....	10
Processing Solutions.....	71
Suppliers Report.....	64
This Month in Coal.....	20



Renewable Energy...32



Underground Haulage...54



Russian Potash...56

भारतीय
INDIAN BUREAU
JUL 2017
केन्द्रीय पत्र-पत्रिका
CENTRAL

FEATURES

Budgets Trimmed, with Closer Focus
Has exploration spending bottomed out? Which companies are most optimistic? Will grassroots project spending pick up? 30

Design Considerations for Ground Support in Nevada's Weak Rock
A new analysis demonstrates how the use of bolts, mesh and shotcrete influence the safety factor for ground support programs 36

Leach Operators Get a Lift from Tech Improvements
The pursuit of higher metal recovery enters the digital age — where even time-tested, conventional leach-optimization techniques stand to benefit from emerging automation and analysis capabilities 40

LEADING DEVELOPMENTS

Barrick Sells 50% Interest in Veladero to Shandong Gold for \$960 Million 4

Freeport's Q1 Copper Output Drops 4

Cliffs' Goncalves Expects 2017 to be Phenomenal 5

Newmont Expands Production at Ahafo in Ghana 5

MAC, PDAC Applaud Canada's 2017 Budget 6

AROUND THE WORLD

U.S. & Canada: PSC: Rocanville Ramp-up Well Underway 8

Latin America: Leagold Acquires Los Filos Gold Mine from Goldcorp 14

Australia/Oceania: Rio Tinto Deals with Bad Weather 18

Africa: Ivanhoe Starts Work on Shaft 2 at Platreef 20

Asia: Vedanta Completes Cairn Merger 24

Europe: Boliden: Mine Production Attains Record Level 25

Exploration Roundup: Cartier Resources Drilling 50,000-m Across Four Gold Projects in Quebec 26



This month, E&MJ reviews some of the heap leaching techniques mines employ to recover metal. On the cover, the world's largest MSC stacks ore at the Cananea mine in northern Mexico. (Photo: FLSmidth)

DEPARTMENTS

Calendar 25

Classified Advertisements 54

Equipment Gallery 50

From the Editor 2

Markets 56

Operating Strategies 44

People 12

Processing Solutions 48

Suppliers Report 46

This Month in Coal 27



News & Analysis

Comment	7
Top Stories	8
Mineral Sands	16
Tamil Nadu mineral sand mining ban extended to end of April	
People and Places	17
Karen G. Narwold, chief administrative officer	
Refractories Hotline	18
China's refractory customers show strength in 2016, but refractories output falls	
Market Monitor	19
Use of graphene in batteries 'still some way away'	
Regulation	21
Examining Somalia's untapped industrial mineral potential	
Moving Minerals	23
Dry bulk freight rate to rise in 2017; MSI Minerals shipments normalise as Yangtze river congestion eases	
Diary Dates	50
Forthcoming industry events	
Industrial Minerals Prices	51
IM analyses the latest pricing trends	
Index to Advertisers	57



Battery demand now accounts for 35% of lithium supply and there are many hoping to develop projects to meet the expected uptick of new demand. But is there enough supply already available? Will there be enough demand to bring the myriad of new projects to fruition? On pages 24-32 **IM** examines the many sides of the lithium demand story - from rising Chinese consumption, to traditional markets - and also looks at the newcomers already supplying the market.

Top Stories

- | | | | |
|----|--|----|---|
| 8 | China's permanent magnet exports drop in February | 12 | Battery Show Europe 2017: Europe must play bigger role in battery industry |
| 9 | Jiande authorities slash number of calcium carbonate producers | 13 | Graphene 2017: 'Cost and confusion' inhibiting graphene penetration |
| 10 | Brazil doubles magnesia exports in Q1 | 14 | Sichuan sets ambitious graphite targets |
| 11 | Growing chlor-alkali industry in China to boost salt demand - Roskill | 15 | Nigerian minister urges domestic use of barite |

More online
www.indmin.com/news

Managing Editor: Barbara O'Donovan
 bodonovan@indmin.com
General Manager: Peter Fitzmaurice
 peter.fitzmaurice@indmin.com
Consultant Editor:
 Stephen Lumsden-Scott
 slumsden@indmin.com
Head of Market Reporting: Yoke Wong
 yoke.wong@indmin.com
Chief Reporter: Davide Ghilotti
 Davide.Ghilotti@indmin.com
Reporter: Martin Facada
 martin.facada@indmin.com
Analyst: Albert Li
 al@indmin.com
Correspondent: Cameron Perks
 cameron.perks@gmail.com

Editorial Design: Paul Rackstraw
 paul.rackstraw@btconnect.com
Advertising Production: Jane Crump
 jane@forshawdesign.co.uk
Advertising Sales Director:
 Tanu Kurian
 tanu.kurian@indmin.com
Advertising Sales: Gabriella Kiss
 gkiss@indmin.com

Editorial
 8 Boulevard Street,
 London, EC4Y 8AX
 T: +44 (0) 20 7827 9977
 F: +44 (0) 20 7827 6441
 E: edit@indmin.com
 www.indmin.com

Advertising
 8 Boulevard Street,
 London, EC4Y 8AX
 T: +44 (0) 20 7556 6019
 F: +44 (0) 20 7827 6441
Marketing
 Dominique Destree
 PO Box 38083,
 London EC4V 5JS
 T: +44 (0) 20 7779 8772
 F: +44 (0) 20 7827 6441
 E: dominique.destree@indmin.com

Sales
 T: +44 (0) 207 779 8386
US office
 1525 E. 53rd St. Suite 516-7
 Chicago IL 60637
 T: +1 (773) 643 1875
 E: kpatel@indmin.com



Pacific Research Office
 Room 305, 57 T. Adam Street, 2255
 Lukjau Ring Road, Shanghai
 China, 200120
 T: +86 21 6307 0857
 F: +86 21 6307 0856
 Industrial Minerals is a part of
European Office - 4 Boulevard
 Street London, EC4Y 8AX
Directors: John Mills (Chairman),
 Andrew Reesman, Colin J. Patricia
 Sergeant, The Viscount Rothermere,
 Colin Jones, Paul Zwielenberg, David
 Pritchard, Andrew Balfingal, Tristan
 Hilgarth

News & Analysis

Comment	7
Top Stories	8
People and Places	16
Bold Bataar, Rio Tinto Minerals	
Moving Minerals	17
Higher freight rates, delivery delays frustrate buyers	
Refractories Hotline	18
Chinese magnesia disruption worsens	
Market Monitor	19
The sun shines on HTC solar technology development	
Regulation	20
Russian government plans to boost rare earths output	
Diary Dates	48
Forthcoming industry events	
Industrial Minerals Prices	42
IM analyses the latest pricing trends	
Index to Advertisers	49



Shifting sands: The image on the front cover depicts two different grades of frac sand. The oilfield minerals market has started to pick up as the oil price has climbed. In this issue of **IM** we look at the many different minerals which serve this sector and discuss the slow growth being experienced in the US frac sand market.

Top Stories

- | | | | |
|----------|---|-----------|--|
| 8 | AkzoNobel spurns PPG again, doubles down on spin-out plans | 13 | China Q1 magnesia exports hit record high as values plunge |
| | Kronos profits surge on higher TiO₂ prices, sales | 14 | Chinese chromite imports dip in March |
| 9 | Karabacak to target steel, battery makers with expanded graphite operation | | Flat glass, construction drive Saint-Gobain's sales |
| | AMG Graphite commissions Mozambique project | 15 | Rising frac sand prices boost producer earnings in Q1 results |

COMPANY RESULTS:

Imerys
China Minmetals
Lomon Billions
Abemarle
Solvay
FMC

More online

www.indmin.com/news

Managing Editor: Barbara O'Donovan
barodovan@indmin.com
General Manager: Peter Fitzmaurice
peter.fitzmaurice@indmin.com
Consultant Editor:
Siobhan Lishmore-Scott
sliemore@indmin.com
Head of Market Reporting: Yoke Wong
yoke.wong@indmin.com
Chief Reporter: Davide Ghilotti
Davide.Ghilotti@indmin.com
Reporter: Martin Facade
martin.facade@indmin.com
Reporter: William Clarke
william.clarke@indmin.com
Analyst: Albert Li
al@indmin.com
Correspondent: Cameron Perks
cameron.perks@gmail.com

Editorial Director: Paul Redshaw
p.r.redshaw@indmin.com
Advertising Production: Jane Crump
jane@forshawdesign.co.uk
Advertising Sales Director:
Taru Kurien
taru.kurien@indmin.com
Advertising Sales: Gabrielle Kiss
gkiss@indmin.com

Editorial
8 Boulevard Street,
London, EC4Y 8AX
T: +44 (0) 20 7827 9977
F: +44 (0) 20 7827 6444
E: edit@indmin.com
www.indmin.com

Advertising
8 Boulevard Street,
London, EC4Y 8AX
T: +44 (0) 20 7556 6019
F: +44 (0) 20 7827 6444

Marketing
Dominique Destree
PO Box 18083,
London EC4V 5JS
T: +44 (0) 20 7779 8172
F: +44 (0) 20 7827 6444
E: dominique.destree@indmin.com

Sales
T: +44 (0) 207 779 8386

US office
1525 E. 53rd St. Suite 516-7
Chicago IL 60737
T: +1 (773) 643 1976
E: kpate@indmin.com

Asia-Pacific Research Office
Room 305, 5/F, A21a Center, 1288
Lujiazui Ring Road, Shanghai,
China, 200120
T: +86-21-5877 0857
F: +86-21-5877 0156

Industrial Minerals is a part of
Euromoney Trading, 4 Boulevard
Street London, EC4Y 8AX

Directors: John Botts (Chairman),
Andrew Rashbass (CEO), Sir Patrick
Sergeant, The Viscount Rothemann,
Colin Jones, Paul Zwillenberg, David
Pritchard, Andrew Bellingh, Tristan
Hilgarth

Features

Editor & Publisher:
Santosh Mahanti

Director:
Sabita Mahanti

Director & Content Strategist:
Kritika Mahanti

Editorial:
Deepshikha Banerjee
Anindita Banerjee

Marketing:
Shyamalendu Banerjee
Angan Chatterjee

New Delhi Representative:
Masood Alam Khan

Design & Layout:
Dipak Adhikari
Amiya Kumar Das

Editorial & Corporate Office:
Merlin Links, Block 5E/5F, 5th Floor
166B, S. P. Mukherjee Road
Kolkata - 700 026
Phone: 91-033-2465-8581/9406
Fax: 91-033-2465-3790
E-mail: isinfo@eth.net,
contact@isinfomedia.in
Website: www.isinfomedia.com

Registered Office:
10, Chowringhee Road,
Kolkata - 700 013

Subscription Rate

Domestic
₹ 10,000 (Yearly)
₹ 950 (Single Copy)

Overseas
\$ 1400 (Yearly)
€ 1200 (Yearly)

Owned & Printed by Santosh Mahanti
at M/s. Gupta Quick Printers
4D/2B, Dharmatala Road
Kolkata - 700 039
and published by him from
10 Chowringhee Road
Kolkata - 700 013, India.

Reproduction of matter published
here, in whole or in parts, is
prohibited without written
permission from the publisher.

The publisher and printer do not
accept any responsibility for
statements, data and opinions
expressed by the author.



Cover: Essar Steel



Cover Story

21
**Essar Steel
Groundbreaking Performance
& Technology**

New product development initiatives are discussed, along with an in-depth conversation with Dilip Dommien, CEO & MD and Vikram Amin, ED Strategy & Business Development of Essar Steel

National Trends

30
**SAIL supplies 90 per cent
steel to India's longest
Dhola-Sadiya bridge**

Current events and latest developments in Indian steel & allied industries

Global Trends

48
**New side trimmer from SMS
group in operation at
Severstal**

Latest news and updates on iron & steel industry across the globe

Focus

62
**NPAs to disappear from the
domestic steel sector**

Several efforts undertaken to do away with NPAs from the steel sector of India

Steel Market

66
**Performance of Domestic
Steel Market in April FY'18**

Report of domestic steel market performance during the very first month of FY 2017-18



Company News

79
**Growing Naturally – Strong
Performance**

An overview of quarterly financial results of Dalmia Bharat Limited

Market & Product

80
**KOCKS Microstructure
Simulator**

A cutting-edge simulation software for the optimisation of rolling processes

Steel Technology

82
**Fundamentals of Lasers and
Application of Laser Sensors
in Steel Industry**

Fundamentals of lasers and implementation of automation schemes in SAIL Steel Plants using laser sensors are described in details



Download the app



Now available on
Android/iOS

Follow us on:



www.facebook.com/ISInfomedia/

Features

Environment

101

Greener Sintering for China

SWGR system from Primetals Technologies for Shansteel, China

Refractory

104

Modelling of Thermo-mechanical Damages of Steel Ladle Shell during Operations

A modelling approach to analyse thermo-mechanical damages observed on ladle shells and methods to avoid damages & extend ladle life

Post Show Report

112

2017 SEAISI Conference & Exhibition

Report on 2017 SEAISI Conference & Exhibition held in Singapore

Upcoming Events

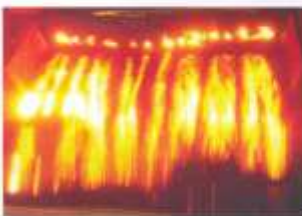
114

Upcoming Business Events/Exhibitions/Trade Fairs in India and around the world

Statistics

116

World Crude Steel Production - Apr'17
Indian Steel Market & Prices - Apr'17



Advertiser / Index	
A	126
ABB	31
Accore Engineering (P) Limited	40-41
A. R. Group of Industries	83
Atoran Group	47
Amari Machine Tools (P) Ltd.	14
ARI Bearings Ltd.	93
Armabic Engineering Private Limited	61
B	6
BRAHM Steel	54
Bolmer Lawrie & Co., Ltd.	75
Bosky Engineering Corporation	Back Cover
C	75
Changzhou Kaiida Heavy Industry Technology Co., Ltd.	75
Creative Carbon Pvt. Ltd.	97
D	56-57
Darseli & Co.	56-57
Dalsina-OCI Refractories	Second Cover
E	Cover
Essar Steel	Cover
Electrotherm (India) Limited	7
Evo Tech Pvt. Ltd.	16
EVERTZ HYDROTECHNIK GmbH & Co., KG	17
EPS Process	53
H	49
HPCL	49
Henan Yuzing Engineering & Technology of Hot Blast Stove Co., Ltd.	8-9
H & K Rolling Mill Engineers Pvt. Ltd.	11
I	35
Inductotherm (I) Pvt. Ltd.	35
Indiana Machine Tools	12
Indrex Global Pvt. Ltd.	45
IWS Macro Services Pvt. Ltd.	20
J	34
Jaypee Power Transmission	34
Jindal Steel & Power Limited	Gate Fold
K	51
KME Germany GmbH & Co., KG	51
L	37
LECO	37
M	77
Metalloy Refractory Refractory Company Private Limited	77
Moan Motion Controls Pvt. Ltd.	121
N	111
Nalhydro	111
National Refractories	Third Cover
National Engineering Industries Ltd.	88
NIMCO Limited	41
O	107
Orind Special Refractories Ltd.	107
P	35
Primetals Technologies	35
R	109
RHI India Private Limited	109
R. Singh & Associates (P) Ltd.	73
S	49
Sanfinggan spa	49
Sigma Minerals Limited	31
SARS group	31
Subscription Form	118
SARL	18
SAF India Limited	115
Sensmar Advt. (Y th Esab 2017)	123
T	83
TMEIC	83
TIL Krosaki Refractories Limited	103
U	78
UGI Engineering Works Pvt. Ltd.	78
V	38-39
Vorder Scientific Private Limited	38-39
Z	18
Zhuzhou Cemented Carbide Works Import & Export Company	18



JOURNAL of THE GEOLOGICAL SOCIETY OF INDIA

(Abstracted/Indexed in AGI's Bibliography and Index of Geology, Chemical Abstracts, Current Contents, GEOBASE, GfERef, Mineralogical Abstracts, GeoArchive, Thomson ISI database (SCIE, CC/PC & ES))

Vol. 89

APRIL 2017

No. 4

CONTENTS

Gas Hydrates: A Possible Future Energy Resource, KALACHAND SAIN 359

RESEARCH ARTICLES

Modeling of Source Parameters of the 15 December 2015 Deogarh Earthquake of M_w 4.0,
PRANTIK MANDAL, B. SINGH, P. NAGENDRA and A.K. GUPTA 363

Techniques for Systematic Collection and Processing of Vertebrate Microfossils from their Host Mudrocks: A
Case Study from the Upper Triassic Tiki Formation of India,
MOHD SHAH BHAY 369

Geochemistry of Mesoproterozoic Deonar Pyroclastics from Vindhyan Supergroup of Central India: Evidences
of Felsic Magmatism in the Son Valley,
MEENAL MISHRA, VAIBHAVA SHIVASTAVA, P.K. SINGHA and HARI B. SHIVASTAVA 375

A Note on 'Composite Dike' in Basement Granite in the Vicinity of Srisaifam Sub-basin near Akkavaram,
Telangana
S.K. SHIVASTAVA, K.K. PARASHAR, K. RAMESH KUMAR, S. NAYAK and A. LAITHA 386

Microflora from Sauripod Coprolites and Associated Sediments of Late Cretaceous (Maastrichtian) Lameta
Formation of Nand-Dongargaon Basin, Maharashtra
HEMANT SOKRUSABE, BANDANA SAMANT and D.M. MOHARBY 391

Soil Void Ratio Correlation with Shear Wave Velocities and SPT N Values for Indo-Gangetic Basin,
ANILAZHAGAN, P., ANJALI UDAY, SAYED S.R. MOKHTAR and NASSIR S.N. AL-ARIFI 398

Rock Mass Classification and Assessment of Stability of Critical Slopes on National Highway-22 in Himachal
Pradesh,
SATISH KUMAR, KISHOR KUMAR and N.N. DOGRA 407

Compositional Appraisal and Quality Implication of Emiwo Metacarbonate Deposit in Central Nigeria,
ONIMBI A. JIMOH, KAMAR S. ARIFFIN, HASHIM B. HUSAIN and TOYIN ABDULKAREEM 413

Deoiphering Heavy Metal Contamination Zones in Parts of Nalgonda District, Telangana,
DANU PURUSHOTHAM, LINGA DHARAVATHI, SIRASISH MISHRA, SUNKARI KAVITHA and G. NAGA VINOD 419

Geochemical Characterization of Source Rock from the North Bank Area, Upper Assam Basin,
ARCHANA DIVI, SHIVANANDA BOROJAH and G.B. GILFELLON 429

CONTENTS

Surface Soil Assessment in the Ubbur Area, North of Jeddah, Western Saudi Arabia, Using a Multichannel Analysis of Surface Waves Method. MAHER ALDAHRI, SAAD MOGREN, KAMAL ABDELRAHMAN, HANI ZAHHAN, SHEHIF EL HADY and MAHMOUD EL-HADROY	435
Juncture of Erosion, Land Use/Cover Status and Hazardous Geomorphic Processes in Central Lesser Himalaya. ANITA PANDE	444
Assessment of Groundwater Quality Index for Drinking Purpose in the Durg District, Chhattisgarh Using Geographical Information System (GIS) and Multi-Criteria Decision Analysis (MCDA) Techniques. D.C. JHARIYA, TARUN KUMAR, RAKESH DEWANGAN, DHARM PAL and PANKAJ KUMAR DEWANGAN	453
Impact of Bioturbation on Reservoir Quality and Production – A Review. JOYJIT DEY and SOUVIK SEN	460
Seismo-Stratigraphic and Structural Interpretation of Seismic Data of Titas Gas Field, Bengal Basin, Bangladesh. MD. SULTAN-UL-ISLAM, MD. AMINUL ISLAM, MD. HASAN LATIF, MD. APTABUZZAMAN, SYED MUSTAFIZUR RAHMAN, MD. ISMAIL MOLLA and MOHAMMED RAGAB SHALABY	471

NEWS AND NOTES

International Conference on ‘Incessant Ganga’ – The Advent of a Holistic, Inclusive and Comprehensive, National River Rejuvenation Approach. VINOD BODHANKAR and R.H. SAWKAR	482
Field Training Course in Glaciology: For Promoting Basic and Application Oriented Techniques. TRIPTI JAYAL	484
Workshop on Knowledge for Flood Disaster Risk Reduction (DRR) in India. SIDDHARTH KUMAR LAHRI and R. BASKAR	485

OBITUARY

Desh Bandu Sikka (1927-2017). C.E. NEHRU and P.S.N. MURTHY	487
---	-----

ANNOUNCEMENT

488

ADDRESS OF EDITOR

All papers intended for publication and also related correspondence should be addressed to: B. Mahabaleswar,
Editor, Geological Society of India, No.63, 12th Cross, Basappa Layout, Gaviapuram, Bengaluru - 560 019.
Email: editorjournalgsi@gmail.com; jgsi.journal@gmail.com; **Mobile:** 09341264052;
Telefax: 080-2661 3352; **Telephone:** 080-2242 2943; **Website:** <http://www.geosocindia.org>.

CONTENTS

Magnetic and Radiometric Signatures over a Proterozoic Massive Sulfide Setting of Northern Fringe of Dalma Volcanics, Eastern India: An Implication to Metallogeny. PRAMOD KUMAR YADAV, P.K. ADHIKARI, SHALJAHAN, ANURAG TRIPATHI, SHAILENDRA SINGH, ROHAN K. SINGH and ASHISH K. BAGE	705
Geochemistry of the Mafic Xenoliths from the Kinnaur Kailash Granite, Buspa Valley, Himachal Pradesh. D. RAMESHWAR RAO and S.S. THAKUR	711
Emergence of the Semi-Empirical Technique of Strong Ground Motion Simulation: A Review. SANDEEP, A. JOSHI, P. KUMARI, S. LAL, VANDANA, PARVATI KUMAR, KAMAL	719
BOOK REVIEW	
Challenges and Strategies in Mineral Exploration and Mining, A.M. Pophare, H.S. Kale and M.L. Dora (Eds) <i>Reviewed by V.N. VARDEEV</i>	723
NEWS AND NOTES	
Is there Real Dearth of Water Resources in Bengaluru? Some Ground Analysis. K.C. SUBHASH CHANDRA	725
Seminar on Desalination of Sea-water and Management of Droughts: A Report. K.N. RADHIKA	726
OBITUARY	
S. Viswanathan (1933-2017), RAVI VISWANATHAN	727
M.P. Singh (1957-2017), P.K. SINGH	729
AUTHOR INDEX	
	730
SUBJECT INDEX	
	735

Cover

Field photograph showing quartz re-melting effects at the crater rim of the Lomar impact crater.

ADDRESS OF EDITOR

All papers intended for publication and also related correspondence should be addressed to: B. Mahabaleswar,
Editor, Geological Society of India, No.63, 12th Cross, Basappa Layout, Gavipuram, Bengaluru - 560 019.
Email: editorjournalgsi@gmail.com; jgsi.journl@gmail.com; **Mobile:** 09341264052;
Telefax: 080-2661 3352; **Telephone:** 080-2242 2943; **Website:** <http://www.geosocindia.org>.

JOURNAL of THE GEOLOGICAL SOCIETY OF INDIA

(Abstracted/Indexed in AGI's Bibliography and Index of Geology, Chemical Abstracts, Current Contents, GEOBASE, GEORef, Mineralogical Abstracts, GeoArchive, Thomson ISI database (SCIE, CC/PC & ES))



Vol. 90

JULY 2017

No. 1

CONTENTS

RESEARCH ARTICLES

<p>Determining the Reference Frame for Kinematic Analysis in S-tectonites Using AMS. MANISH A. MAMTANI, V. ABHIRAM, SIVAJI LAMBE, VIRENDRA RANA, SANDEEP BHATT, SHALINI GOSWAMI and A.R. RENJITH</p>	5
<p>Paleomires of Eocene Lignites of Bhavnagar, Saurashtra Basin (Gujarat), Western India: Petrographic Implications . PRAKASH K. SINGH, VIJAY K. SINGH, M.P. SINGH and P.K. RAJAK</p>	9
<p>Comparative Petrophysical and Geochemical Characteristics of Thermal and Volcanic Ash from Southeastern India. GRITHANJALI KRISHNAN, HEMA ACHYUTHAN and V.H.R. SIVA</p>	20
<p>Delineation of Rajmahal Basaltic Flows, Inter-trappeans and Associated Coal Layers using Audio-magneto-telluric Method PIYUSH PRIVAM and S.K. PAL</p>	25
<p>Post-stack Seismic Inversion and Attribute Analysis in Shallow Offshore of Krishna-Godavari Basin, India. BAISAKHI DAS, RIMA CHATTERJEE, DIP KUMAR SINGHA and RAJAN KUMAR</p>	32
<p>Implication of the Middle Jurassic Pholadomyoids of Kachchh in the Palaeobiogeography of the Middle East and South Asia: A Review. ANAND K. JAITLY</p>	41
<p>Geological Evaluation of EIGEN-6C4 and GOCE Derived Gravity Models in and around Karakoram Shear Zone, Leh, India. PRIVIM ROY, A. SAI KRISHNAVENI and K. VINOD KUMAR</p>	51
<p>Geochemical Characteristics and Evaluation of Minor and Trace Elements Pollution in Groundwater of Tuticorin City, Tamil Nadu, India using Geospatial Techniques S. SELVAM, S. VENKATRAMANAN, P. SIVASUBRAMANIAN, S.Y. CHUNG and C. SINGARAJA</p>	62
<p>Groundwater Quality Assessment for Drinking Purpose in Raipur City, Chhattisgarh Using Water Quality Index and Geographic Information System. RUBIA KHAN and D.C. JHARIYA</p>	69
<p>Risk Assessment of Metals from Groundwater in Northeast Rajasthan. VIKAS DUGGAL, ASHA RANI, ROHIT MISHRA and V. BALARAM</p>	77
<p>Petrochemical and Petrotectonic Characterisation of Ophiolitic Volcanics from Great Nicobar Island Andaman-Sumatra Belt R. SACHIN, SUBODH VERMA and TAPAN PAL</p>	85

CONTENTS

Evaluation of the Bearing Capacity of Near-Surface Soils Using Integrated Methods: A Case Study of Otukpa, Ogbadibo Lga, Benue State, North-Central Nigeria. PETER AMIEL, OGBONNAYA IGWE, BERNADETTE UKAH	93
The Effect of the Textural Characteristics on the Engineering Properties of the Basalts from Yozgat Region, Turkey. ERSEN KOLAY and TUĞÇE BAKIR	102
Textural Studies on Red Sediments of Bhimuniapatnam, Andhra Pradesh, East Coast of India. K.N. MURALI KRISHNA, K.S.N. REDDY, CH. RAVI SEKHAR, P. GANAPATHI RAO and K. BANGAKU NAIDU	111
BOOK REVIEW	
Principles of Radiometric Dating by Kunchitapadam Gopalan. <i>Reviewed by</i> RAJIKANT VADLAMANI	118
Antarctica: The Coming Impact. by Arun, I.R. Chaturvedi and Ashok Surwade. <i>Reviewed by</i> RAJENDRA SHUKLA	119
DISCUSSION	
Experimental Studies to Constrain Parental Magma of Malangtoli Volcanics from Singhbhum Craton of the Eastern Indian Shield. Comment: SHABIER HABIB ALAY	120
Reply: JYOTISHANKAR RAY	120
NEWS AND NOTES	
Source of Ground Water and Sea Water Distillate (Patala Gange): Are they Same or Different? R.H. SAWKAR	121
Environmental Mineralogy and Geochemistry – The Case of Uranium Contamination, RAJEN SEN and SHARADINDRA CHAKRABARTI	124
EARTHMIA: Cities on Treadmills. K.R.Y. SIMHA	126
OBITUARY	
Janardan Ganapatirao Negi (1936-2016), R.N. SINGH, V.P. DIMRI and O.P. PANDEY	127

Cover

Electron Backscatter Diffraction (EBSD) study of Peninsular Gneiss from Dharwar Craton (Southern India) that has visible foliation but no stretching lineation. EBSD data of quartz were generated in a thin section prepared parallel to the principal plane of the Anisotropy of Magnetic Susceptibility (AMS) ellipsoid that contains the maximum (K_1) and minimum (K_3) axis. (a), (b) and (c) show photomicrograph, inverse pole figure EBSD map, and quartz crystallographic axes pole figures, respectively. The study highlights that K_1K_2 plane of the AMS ellipsoid can be equated with XZ section of the strain ellipsoid to carry out kinematic analysis in S-tectonites. See Mannani et al. (this issue) for details.

ADDRESS OF EDITOR

All papers intended for publication and also related correspondence should be addressed to: B. Mahabaleswar, Editor, Geological Society of India, No.63, 12th Cross, Basappa Layout, Gavipuram, Bengaluru - 560 019.

Email: editorjournalgsi@gmail.com; jgsi.journal@gmail.com; **Mobile:** 09341264052;

Telefax: 080-2661 3352; **Telephone:** 080-2242 2943; **Website:** <http://www.geosocindia.org>.

JOURNAL OF MINES, METALS & FUELS

INCORPORATING INDIAN MINING JOURNAL (II ISSN 0022-2735)
(FOUNDED BY LATE P.K. MENON)

Adviser: PROF. A. K. GHOSE, FNAE

Editor: P. K. CHANDA

Publishers:
BOOKS & JOURNALS PRIVATE LTD.

Editorial Advisory Board
Prof. A. K. Ghose, FNAE
Prof. R.N. Singh
Prof. Dr. Uday kumar
Prof. Dr. Abdolhadi Ghazvinian
Prof. Dr. Jayanta Bhattacharyya
R.P. Ritolia

Editorial & Business Offices:
6/2 MADAN STREET
KOLKATA 700 072

Telephone :
0091 33 22126526

Fax:
0091 33 22126348

E-mail:
bnjournals@gmail.com
web: www.journalmp.com

Registered Office:
Books & Journals Pvt. Ltd.
6/2 Madan Street
(3rd Floor)
Kolkata 700 072

ANNUAL SUBSCRIPTION

Indian:
Rs.2000.00
by M.O., draft or local cheque
Rs.2035.00 by outstation cheque

Foreign:
£250.00 or \$300.00

Monthly issue:
Rs.100.00; £10.00 / \$15.00
Back issues at double rates

65
YEARS IN
PUBLICATION
1952-2017

Vol.65, No.2, FEBRUARY 2017

CONTENTS

- Stability analysis of a mine waste dump over an existing dump
by Abhiram Kumar Verma, Debasis Deb and Subir Kumar Mukhopadhyay 41
- Effect of various parameters on the performance of the blasthole drilling
by Alok Yardhan, Ajit Kumar and K. Dasgupta 49
- Review of exploration data with respect to outliers: experience
XXX deposit of NMDC Ltd
by S. K. Sinha, B. S. Choudhary and R. K. Sharma 55
- Study on optimization of hydraulic cutting nozzle and application
by Hongqing Zhu, Wentao Liao, Kai Sheng, and Bei-fang Gu 61
- Selection of optimum cut-off grade for surface mining of
metalliferous deposits: a review
by Pritam Biswas and Phalguni Sen 66
- Reservoir architecture of braided river and remaining oil distribution in
YSM oil field
by Li Xurwei and Fu Xiaoliang 80
- Research on the rules of influence of transparent agent infiltration on adsorption
and diffusion of coal petrography gas
by Wen Zhihui, Zhao Yansia, Wang Honglei and Ren Xichao 85

Enlist as a subscriber to :

INDIAN JOURNAL OF POWER & RIVER VALLEY DEVELOPMENT

A technical monthly devoted to development of
power and water resources in Asia

Annual Subscription :
Rs.2000 (India); £250.00 or \$300.00 (Foreign)

Write to :
The Manager

BOOKS & JOURNALS PRIVATE LTD.

6/2, Madan Street, Kolkata 700 072
Tel: 0091 33 22126526 • Fax: 0091 33 22126348 • E-mail: bnjournals@gmail.com

CONTENTS



JPC
BULLETIN ON IRON & STEEL

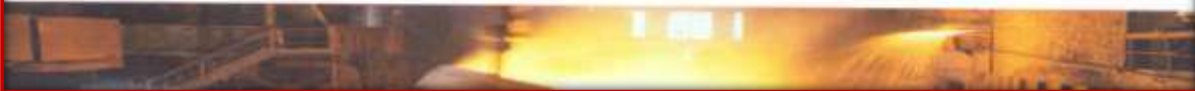
Vol.17 No.4 April
2017

CONTENTS



CONTENTS

Trend Report	1
Feature	12
Focus	18
Upcoming Project	25
News National	28
News International	34
Upcoming Events	39
Summary	40
Statistics	41



Features

18

Cover story

Alcoa Corp's ceo, Roy Harvey, gives an insight into his vision for the company now that it has separated from Arconic



Asian market

24

Asian exchanges grow and diversify

An update on Asia's commodity exchanges as their trading volumes continue to climb

31

Views from Asia

The region's leading players talk about new opportunities and initiatives in metal trading and production

34

The LME talks strategy

The LME's recently published discussion paper on market structure addresses fundamental questions about its strategy

Visit the website metalbulletin.com



Download the app



Join the Metal Bulletin Group



Follow [@metalbulletin](https://twitter.com/metalbulletin)

36

CME's focus on metals

The CME Group provides an insight into its focus on metal trading in the Asia Pacific region

Aluminium applications

40

Indonesia's downstream aluminium industry

An in-depth look at the downstream aluminium industry in Indonesia covering both its history and prospects

51

Indian promise

Outlining the growth plans of the major companies in India's aluminium market



55

The power over-head

What's the future for aluminium as the composition of overhead power conductors continues to evolve?

58

A very big press

Sapa talks strategy during the opening ceremony for its upgraded press in Lichtervelde, Belgium

Precious metals

62

Gold market drivers and outlook

FastMarket's head precious metals analyst examines the outlook for gold following its rally over recent months



May

METAL BULLETIN May 2017

News and analysis

8

Non-ferrous news review

A summary of key developments in the non-ferrous sector over the past month

10

Steel news review

A round-up of important developments in the iron and steel sectors over the past month

12

Base metals and steel analysis

Metal Bulletin Research analyses the drivers of the base metals, steel and steel raw materials markets

16

Regional reviews

Correspondents in Europe, North America, Latin America, Asia, Africa and the Middle East discuss topical issues in their regions

70

Chartist

China and base metals – challenges ahead

Regulars

7

Comment

23

People moves

New appointments around the global metals industry

65

Supply chain services

News from service providers across the metals supply chain

23



66

Innovations

New developments in metals technology, processes and products

67

End-user

Advances and market developments in applications

68

Events

Forthcoming conferences and exhibitions

Prices

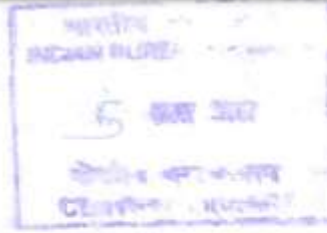
69

March averages



Mineral Economics

Volume 30 • Number 1 • April 2017



Raw Materials Report

Special Issue: Sustainable mining in the Northernmost Europe (SusMinNord)

Editors: Magnus Ericsson, Kristiina Jokelainen

EDITORIALS

Mineral Economics/Raw Materials Report 30th anniversary

M. Ericsson 1

Mineral Economics—special issue on the SusMinNord project • Foreword

M. Pellegrini 3

Introduction

M. Ericsson · K. Jokelainen 7

ORIGINAL PAPERS

Stakeholder management theory meets CSR practice in Swedish mining

H. Ranängen 15

Social impacts of the "glocal" mining business: case studies from Northern Europe

L. Suopajarvi · T. Ejdemo · E. Klyuchnikova · E. Korchak ·
V. Nygaard · G.A. Poelzer 31

Challenges that mining companies face in gaining and maintaining a social license to operate in Finnish Lapland

P. Lesser · L. Suopajarvi · T. Koivurova 41

**The local employment impacts of mining: an econometric
analysis of job multipliers in northern Sweden**
T. Moritz · T. Ejdemo · P. Söderholm · L. Wärell 53

BOOK REVIEW

**A Handbook of Primary Commodities in the Global
Economy · Second Edition, Marian Radetzki and
Linda Wärell. Cambridge University Press, Cambridge
2016. [ISBN 978-1-107-12980-1 Hardback]**
P. Crowson 67

Indexed in Google Scholar, EBSCO, Environment Index, OCLC, Research
Papers in Economics (RePEc), Summon by Serial Solutions.

Instructions for Authors for *Mineral Economics* are available at
<http://www.springer.com/13563>

CONTENTS

*A Publication
of the Society
for Mining,
Metallurgy and
Exploration Inc.*

Special Review Article

✓ **Heap leach modeling – A review of approaches to metal production forecasting** 53

J.O. Marsden: Metallurgium, Phoenix, AZ, USA
M.M. Botz: Elbow Creek Engineering Inc., Billings, MT, USA

✓ **Comparative analysis of the effect of microwave pretreatment on the milling and liberation characteristics of mineral matters of different morphologies** 65

V. Singh: Tata Steel, Jamshedpur, India
R. Venugopal: Indian School of Mines, Dhanbad, Jharkhand, India
S.K. Tripathy: Tata Steel, Jamshedpur, India
V.K. Saxena: Indian School of Mines, Dhanbad, Jharkhand, India

Production of chalcocite by selective chlorination of chalcopyrite using cuprous chloride 76

J. Kang and J.Y. Lee: Korea Institute of Geoscience and Mineral Resources, Daejeon, Korea, and University of Science and Technology, Daejeon, Korea

Comparative study of pellets fired in pot grate and grate kiln pilot furnaces 84

S.S. Wendling and R.C. Nascimento: Instituto Federal do Espírito Santo (IFES), Vitória, Espírito Santo, Brazil
F. Wendling: Radieng Consulting Ltd., Guarapari, Espírito Santo, Brazil

Solubility of rhodium in doré metal 91

K. Avamoa and P. Taskinen: Aalto University, Espoo, Finland

System dynamics and discrete event simulation of copper smelters 96

A. Navarra: Universidad Católica del Norte, Antofagasta, Chile
H. Marambio and F. Oyarzún: Universidad de Atacama, Copiapó, Chile
R. Parra: Universidad de Concepción, Concepción, Chile
F. Mucciardi: McGill University, Montreal, Canada



**Volume 34, No. 2
May 2017**

Mining engineering

OFFICIAL PUBLICATION OF SME
www.miningengineeringmagazine.com

MAY 2017
VOL. 69 NO. 5



Feature Articles

- 16** **Drill & blast implementation case study at multiple Freeport-McMoRan sites**
S. Gering, C. Calderon-Arteaga, L. Gutierrez and T. White
- 24** **Robust showfloor reflects optimistic mood at 2017 Annual Conference and Expo**
William Gleason, Georgene Renner, Chee Theng
- 28** **Annual Review 2016: Exploration**
N.A. Karl and D.R. Wilburn
- 50** **Annual Review 2016: Mining**
J.A. Ober



Special Editorial Section T&UC

- 11** **Compensation and jet grouting as mitigation for a TBM operation**
Antonio Raschilla, Valerio Violo and George Kafantaris
- 19** **Planning of the San Francisco Public Utilities Commission's Channel Tunnel**
R. John Caulfield, Art Hamid and Manfred Wong

Technical Papers (peer-reviewed and approved)

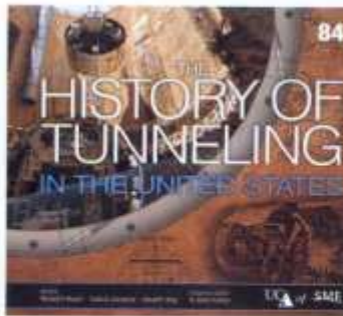
- 63** **Human thermoregulation model for analyzing the performance of mine refuge alternatives**
M. Klein and M. Hepokoski
- 69** **Respirable dust measured downwind during rock dust application**
M.L. Harris, J. Organiscak, S. Klima and I.E. Perera

Copyright 2017 by the Society for Mining, Metallurgy & Exploration, Inc. All rights reserved.
MINING ENGINEERING (ISSN 0025-3187) is published monthly by the Society for Mining, Metallurgy, and Exploration, Inc., at 12999 E. Adam Aircraft Circle, Englewood, CO, 80113 USA. Phone 1-800-762-3132 or 1-303-948-4200. Fax: 1-303-973-3845 or email: sme@smenet.org. Website: www.smenet.org.
Periodicals postage paid at Englewood, CO USA and additional mailing offices. Canadian post: publications mail agreement number 969868.
POSTMASTER: Send changes of address to MINING ENGINEERING, 12999 E. Adam Aircraft Circle, Englewood, CO, 80112 USA.
Printed by Doremags Printing Co.

Mining engineering

OFFICIAL PUBLICATION OF SME
www.miningengineeringmagazine.com

MAY 2017
VOL. 69 NO. 5



SME News

- 75 MEC
- 76 Fine Grind
- 77 Personal News
- 78 SME Foundation
- 79 Student News
- 80 Obituaries
- 81 Membership
- 83 Safety Share



Departments

- 6 President's Page
- 8 Politics of Mining
- 10 Industry Newswatch
- 84 New Media
- 85 Coming Events
- 86 Classifieds
- 88 Web Directory
- 89 Professional Services
- 95 Index of Advertisers
- 96 Drift of Things

In This Issue

Mineral production in the United States during 2016 continued to be a fundamental element to the nation's economy. The estimated value of nonfuel and industrial mineral production was \$74.6 billion last year, up from \$73.4 billion in 2015. The annual mining review begins on page 50. On the exploration side, gold again led the way in budgeted spending in 2016. However, the amount budgeted for exploration work was down by 22 percent from 2015. The annual exploration review begins on page 28. More than 8,300 professionals attended the SME Annual Conference and Expo in Denver in February. ME's Georgene Renner, Bill Gleason and Chee Theng provide coverage of the event beginning on page 24. Shutterstock cover photo.

This month exclusively on
MiningEngineeringMagazine.com:

Plus: Follow all of the recent news and developments from around the world, including:

- Legislation that affects the mining industry.
- The latest merger and acquisition news.

Plus much more!

See it all at www.MiningEngineeringMagazine.com



Editorial Staff

Editor

Steve Kral
kral@smenet.org

Senior Editor

William M. Gleason
gleason@smenet.org

Senior Editor

Georgene Renner
renner@smenet.org

Technical Editor

Chee Theng
theng@smenet.org

Production Graphic Artist

Ted Robertson
robertson@smenet.org

Business Staff

Media Manager/Advertising

Ken Goering
goering@smenet.org

Phone: 1-800-763-3132

Fax: 1-303-973-3645

Email: goering@smenet.org

Society for Mining, Metallurgy, and Exploration, Inc. Officers

President

John G. Mansanti

President-Elect

Barbara Arnold

Past President

Timothy Arnold

Executive Director

David L. Kanagy

Mining Engineering Committee

Mark Jorgensen (Chair), Richard A. Weber (Vice Chair), Chris Kaiser, Purushotham Tukkaraja, Catherine Joyner, Scott Shuey and Jürgen Brune

Peer Review Editorial Board

Jürgen F. Brune, Kirk McDaniel, Kelvin Wu, Nikhil Trivedi, Rajive Ganguli, Rennie Kaunda, Hugh Miller, Biswajit Samanta, Rossen A. Halatchev, Bharath Belle, Philipp Hartlieb, Christopher Pritchard, Jamal Rostami, John Grubb, Pierre Mousset-Jones, Erik Westman, Helmut Mischo, Sekhar Bhattacharyya, Andrea Brickley and P. Tukkaraja

Reproduction: More than one photocopy of an item from SME may be made for internal use, provided fees are paid directly to the Copyright Clearance Center, 222 Rosewood Dr., Danvers, MA, 01923, USA. Phone 1-978-750-8400, fax 1-978-750-4470. PDF files of articles in Mining Engineering are available at www.miningengineeringmagazine.com or www.smenet.org. Other forms of reproduction require special permission from, and may be subject to fees by, SME. SME is not responsible for any statements made or opinions expressed in its publications. Member subscription rate included in dues. Nonmember subscription rate: \$245; in Europe, \$275. Single copies \$20.

Mining engineering

OFFICIAL PUBLICATION OF SME
www.miningengineeringmagazine.com

JUNE 2017
VOL. 69 NO. 6



46

Feature Articles

18 The effects of wave detonation collisions on rock throw

P.G. Cahill, C.E. Johnson and J. Nawrocki

32 Mitigation; Helping projects move forward

Kelly Sands

36 Mining faculty across the globe; A glimpse into tomorrow's opportunities

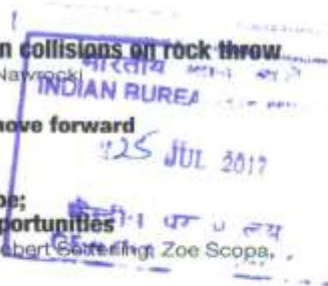
Ebrahim Tarshizil, Emily Sarver, Robert Gatterling, Zoe Scopa, Ryan Livernois and Leah Frost

41 The mineral baby; Iconic graphic continues to tell important story

David M. Abott

46 2017 Minnesota Conference; Global expertise and a local focus

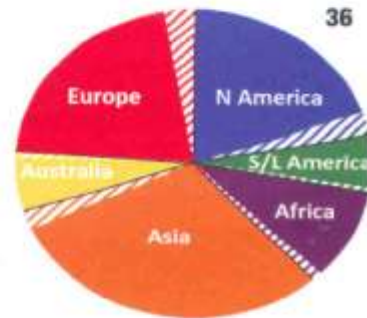
William Gleason



18



41



36

Technical Papers (peer-reviewed and approved)

49 Update of industrial minerals and rocks of New Mexico

V.T. McLemore

57 Characterization of a mine fire using atmospheric monitoring system sensor data

L. Yuan, R.A. Thomas and L. Zhou

Copyright 2017 by the Society for Mining, Metallurgy & Exploration, Inc. All rights reserved.
MINING ENGINEERING (ISSN 0098-5197) is published monthly by the Society for Mining, Metallurgy, and Exploration, Inc., at 12989 E. Adam Aircraft Circle, Englewood, CO, 80112 USA. Phone 1-800-763-2132 or 1-303-948-4200. Fax: 1-303-973-3845 or email: smem@smenet.org. Website: www.smenet.org. Periodicals postage paid at Englewood, CO USA and additional mailing offices. Canadian post: publications mail agreement number 0696984.
POSTMASTER: Send changes of address to MINING ENGINEERING, 12989 E. Adam Aircraft Circle, Englewood, CO, 80112 USA.
Printed by Cummings Printing Co.

Mining engineering

OFFICIAL PUBLICATION OF SME
www.miningengineeringmagazine.com

JUNE 2017
VOL. 69 NO. 6



SME News

- 63 SME Library
- 64 Fine Grind
- 64 Membership
- 65 Environmental Division
- 66 SME Foundation
- 67 MEC
- 68 Obituaries



Departments

- 6 President's Page
- 8 Politics of Mining
- 10 Industry Newswatch
- 69 Coming Events
- 70 New Media
- 71 Classifieds
- 72 Web Directory
- 73 Professional Services
- 79 Index of Advertisers
- 80 Drift of Things

In This Issue

Cast blasting is the primary way of overburden displacement in surface coal mining. Increased throw minimizes costs by reducing the amount of material that needs to be rehandled. The effects of wave detonation collisions on rock throw are explained on page 18. Mines of the future will be much different than they are today. So mining faculty will need to be better educated in technology. A glimpse of tomorrow's opportunities in mining education is discussed on page 28. SME's mineral baby posier has been around for many years. Even today, though, this iconic graphic continues to tell an important story, page 41. SME's Minnesota Section had a successful conference in April. ME's Bill Gleason reports on page 46. Shutterstock cover photo.

This month exclusively on
MiningEngineeringMagazine.com:

Quality equipment directly impacts safety and efficiency
by John Dean

Plus: Follow all of the recent news and developments from around the world, including:

- Legislation that affects the mining industry.
- The latest merger and acquisition news.

Plus much more!

See it all at www.MiningEngineeringMagazine.com



Editorial Staff

Editor

Steve Kral
kral@smenet.org

Senior Editor

William M. Gleason
gleason@smenet.org

Senior Editor

Georgene Renner
renner@smenet.org

Technical Editor

Chee Theng
theng@smenet.org

Production Graphic Artist

Ted Robertson
robertson@smenet.org

Business Staff

Media Manager/Advertising

Ken Goering
goering@smenet.org

Phone: 1-800-763-3132

Fax: 1-303-973-3845

Email: goering@smenet.org

Society for Mining, Metallurgy, and Exploration, Inc. Officers

President

John G. Mansanti

President-Elect

Barbara Arnold

Past President

Timothy Arnold

Executive Director

David L. Kanagy

Mining Engineering Committee

Mark Jorgensen (Chair), Richard A. Weber (Vice Chair), Chris Kaiser, Purushotham Tukkaraja, Catherine Joyner, Scott Shury and Jürgen Brune

Peer Review Editorial Board

Jürgen F. Brune, Bharath Belle, Sekhar Bhattacharyya, Andrea Brickley, Elisabeth Clausen, Rajive Ganguli, John Grubb, Rossen Halatchev, Philipp Hartlieb, Rennie Kaunda, Kirk McDaniel, Hugh Miller, Helmut Mischo, Pierre Mousset-Jones, Christopher Pritchard, Jamal Rostami, Biswajit Samanta, Purushotham Tukkaraja, Nikhil Trivedi, Erik Westman, Kelvin Wu

Reproduction: More than one photocopy of an item from SME may be made for internal use, provided fees are paid directly to the Copyright Clearance Center, 222 Rosewood Dr., Danvers, MA, 01923, USA. Phone 1-978-750-8400, fax 1-978-750-4470. PDF files of articles in Mining Engineering are available at www.miningengineeringmagazine.com or www.smenet.org. Other forms of reproduction require special permission from, and may be subject to fees by, SME. SME is not responsible for any statements made or opinions expressed in its publications. Member subscription rate included in dues. Nonmember subscription rate, \$245; in Europe, \$275. Single copies \$25.

www.miningengineeringmagazine.com

Mining Engineers' Journal

ISSN 0975 - 3001



Official Publication of
Mining Engineers' Association of India

Vol. 18

No. 11

MONTHLY

June - 2017



T. Victor
President

Vice President - I
Anun Kumar Kothari

Vice President - II
S.K. Pattnaik

Vice President - III
K. Madhusudhana

Secretary General
Koneru Venkateswara Rao

Jt. Secretary cum Treasurer
Ashok Kumar Gupta

Immediate Past Presidents
A. Bagchi, Dr. S.K. Sarangi, Dr. V.D. Rajagopal,
R.P. Gupta, Meda Venkataiah

Council Members (Elected)
B. Ramesh Kumar, A.N. Joshi, D.A. Hiremath, V. Srikanth,
M. Sathymurthy, Prof. S.S. Rathore, Dr. P.C. Purohit,
Kelli Umamaheswara Rao, A.K. Prajapati, P. SarathKumar,
Prof. Bhabhesh C Sarkar, S.C. Suthar, C.S. Dhavaji, Murari Lal Gupta,
H.D. Nagaraja, Mahendra Kumar Mehta,
Vijay Singh A.R., Yuvaraj Kadadi, D.V. Pichamuthu, B.S.P. Raju

Council Members (Nominated)
Pradeep Koneru, A.Srikanth, Palani Kumaresan, Dipesh Dipu, S.N.Mathur

Council Members (Co-Opted)
S. Sree Kumar, S. Kumaraswamy, Anil Mathur, A.S. Rao, Nagesh Shenoy

Representatives of Life Institutional Members
M/S. Sesa Goa Ltd (LIM -11), M/S. A.P. Mineral Dev. Corp. Ltd (LIM -12),
M/S. W.B. Engineers International Pvt. Ltd (LIM -13),
M/S. M.P.L. Parts & Services Ltd (LIM -14),
M/S. Shree Engineering Services (LIM -15)

this issue contains...

President's Message	5
Editorial	7
News from the Mining World	8
Development of Mathematical Models for Prediction of Compressive Strength & Water Absorption of Bricks prepared Using IOW, Cement & Fly Ash with different Mix Ratio	13
- Shreekanth R Lamani, Aruna Mangalpaday & Harsha Vardhan	
Mine Water Management in Underground Gold Mines of Kolar Gold Fields	20
- L. M. Niranjana Murthy	
MEAI News	29
Conferences, Seminars, Workshops etc.	34

On the front cover:

Toquepala copper mine, Peru.

Image: Southern Copper

Correspondence Address National Head Quarters & Secretariat

Contact: Secretary General,
Mining Engineers' Association of India
F-608 & 609, Raghavaratna Towers, 'A' Block, VI Floor,
Chirag Ali Lane, Abids, Hyderabad - 500 001.
Ph.: 040-66339625, 29801069
E-mail : meal1957@gmail.com Website : www.meal.org

The Views expressed by the authors in these pages are not necessarily those of publisher / editor / MEAI. Reproduction in whole or in part is strictly prohibited without written permission from the publisher.

MINING MAGAZINE May 2017

Closure for Joy-Komatsu deal

On April 5, Komatsu America announced that it had finally closed its acquisition of fellow OEM Joy Global. The transaction, which was initially presented to the industry on July 21, 2016, aims to leverage the companies' synergies and enhance Komatsu's existing product line with Joy's extensive range of underground mining equipment and smart technologies.

In the end, the acquisition of Joy Global's common shares cost Komatsu US\$2.82 billion, and advisory fees and other expenses were approximately ¥3.4 billion (US\$310 million), bringing the total bill to a cool US\$3.7 billion once Joy's indebtedness was taken into account. Joy Global shares have now been delisted from the NYSE and will no longer be publicly traded.

Going forward, Joy Global will be renamed Komatsu Mining Corp and will operate as a subsidiary of Komatsu, and Komatsu said "the company will continue to promote and invest in the P&H, Joy and Montabert product brands".

The question is: will we be seeing more yellow equipment underground, or will the traditional Joy orange outfit be retained? Either way, although the exact timing of the rebranding is yet to be announced, Joy employees are already using Komatsu email addresses, so we can assume the change is imminent.

More importantly, will Komatsu's existing global mining operations/facilities be rolled into this new company?

"The combination of our Komatsu-brand surface mining equipment with the P&H, Joy and Montabert brands of surface and underground products will allow us to offer a complete range of mining solutions for our customers," said Tetsuji Ohashi, president and CEO of Komatsu.

"We plan to build on the strength of our shared cultures, including our unwavering belief in safety first and our passion for providing innovative solutions, to become an unrivalled mining solutions and services provider."

Of course, Komatsu is not just buying products; with the Joy acquisition come 10,000 new employees with significant collective expertise and a very large client base. And, while Komatsu Mining will make Joy's former HQ its new base, it will be interesting to see which manufacturing and distribution operations the company keeps, and which are consolidated; I can't imagine it will want to keep them all.

At the helm of the new business will be Jeffrey Dawes, former head of Komatsu Latin America, who, according to his communications team, is currently touring Joy's major facilities and meeting with his new teams.

Understandably, and quite sensibly, Dawes wishes to talk to his staff before the press, so an interview will have to wait. Rest assured though, I'm on the case. Watch this space...

CARLY LEONIDA, EDITOR

carly.leonida@miningmagazine.com Twitter: @MM_Ed_Carly

"The question is: will we be seeing more yellow equipment underground, or will the traditional Joy orange outfit be retained?"



CONTENTS

- News 2
- Mining Magazine Awards: Presentation gallery 6
- Interview: Roy Slack, Cementation Canada 8
- Special report: FLSmidth at Los Pelambres 10
- Mine of the month: Kilimapesa 12
- Feature: Tyres 16
- Feature: Underground development 27
- Snapshots: Shovel walk at Hill Creek 34
- Feature: Locomotives 36
- Feature: Engineering at Yanfolila 40
- Feature: Utility vehicles 43
- Semi-famous last words 48
- Contacts 48

Next month

THE ENERGY EFFICIENCY ISSUE
Underground load & haul
Ventilation & Comminution
Conveyors
Energy efficiency in comminution
Alternative energy sources

COVER

The raise-boring technique and technologies have come a long way. Today, it is often the preferred means of excavating openings in many underground mines. In underground mines raise boring is used in the construction of major capital infrastructure such as ventilation shafts, material passes and manways. It is also, at times, chosen for mine production. MM looks at the technique. See page 27

MINING MAGAZINE June 2017

Refocusing our energy

It gives me great pleasure to welcome you to the second of our special themed issues this year, this time on energy efficiency. This is an issue that affects everyone, no matter what stage/level/degree to which you are involved with the mining industry. From OEMs building haul trucks, to operators and drillers underground, to ports shipping out product, there is no escaping the need for energy saving, or the level of accountability now in place across most of the world's major mining markets.

Through the supply of metals and coal, mining underpins virtually every aspect of industry and thus society across the globe. And while we cannot always influence the choices of consumers at the end of the chain, we can ensure that the raw products at the beginning are extracted and processed in the greenest way possible. Responsibility is the key word here.

With that in mind, we have endeavoured to bring you some of the latest projects, initiatives and technologies from around the globe, which can assist you in making smart investment and operating decisions at your own mines.

Need to review your energy-supply strategy, or perhaps your company is about to start a greenfield project in a remote location with an off-grid power supply?

Turn to page 28 for expert advice on getting renewable energy sources, such as hydroelectric, solar, wind or even nuclear to work for you.

Perhaps comminution is your Achilles heel?

Then you're not alone. The crushing and grinding of ore accounts for nearly 20% of total energy usage worldwide and our feature, starting on page 14, provides information on some free resources and strategies that could help reduce your site's consumption.

Also detailed is an innovative project that PETRA Data Science recently completed with Newcrest. The miner has saved millions of dollars by using algorithms to reduce downtime at the Lihir SAG mills.

If you're interested in new ways to reduce your ventilation costs, then you can find that information on page 40 and, on page 48, we address the root cause of the underground emissions problem by considering the pros and cons of battery-electric load and haul fleets.

This was a hot topic at the CIM Convention in Montreal, Canada, in early May and a subject I have been eager to share with you for some time. In this feature, miners and OEMs share their experiences of developing and introducing battery-powered machines underground, and provide details (and, most importantly) numbers to support the business case of going 'all-electric'.

Our fantastic print content is, as always, supplemented by plenty of online exclusive articles, so don't forget to visit MiningMagazine.com for further case studies and interviews, as well as links to further reading and other online resources.

Energy efficiency is a controversial topic, one which cuts to the core of the way the mining industry operates and turns traditional operating models on their head.

However, in this era of post-truth politics, we have strived to provide a factual and objective overview of the matter in hand, and a trustworthy guide to help you explore your options. Let us know what you think of our efforts.

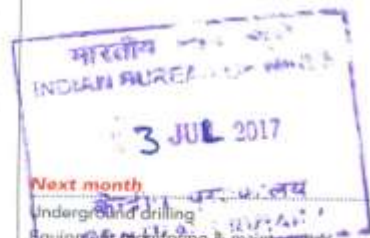
CARLY LEONIDA, EDITOR
 carly.leonida@miningmagazine.com Twitter: @MM_Ed_Carly

"The miner has saved millions of dollars by using algorithms to reduce downtime"



CONTENTS

- News 2
- Mine of the Month: El Teniente 6
- Interview: Olivier Guyot & John Cullen, Metso 9
- Feature: Comminution 14
- Feature: Conveyors 20
- Feature: Alternative energy sources 28
- Snapshot: Wind power at Raglan 38
- Feature: Ventilation 40
- Feature: Underground load & haul 48
- Semi-annual list words 50
- Contacts 56



Next month
 Underground drilling
 Equipment monitoring & maintenance
 Slope design and monitoring
 Preconcentration technologies
 Collaboration in innovation
 Advertiser profiles

COVER
 Sempertrans of Austria and Leitner of Italy have developed a new long-distance bulk-transport system, the Flyingbelt, a combination of ropeway and conveyor belt. At around 7km in length, this Flyingbelt in Brazil is the longest in the world. It connects a limestone mine with a cement plant. Under the most difficult topographical conditions, 1,500 tonnes of limestone per hour are transported at a height of up to 36m. www.sempertrans.com