

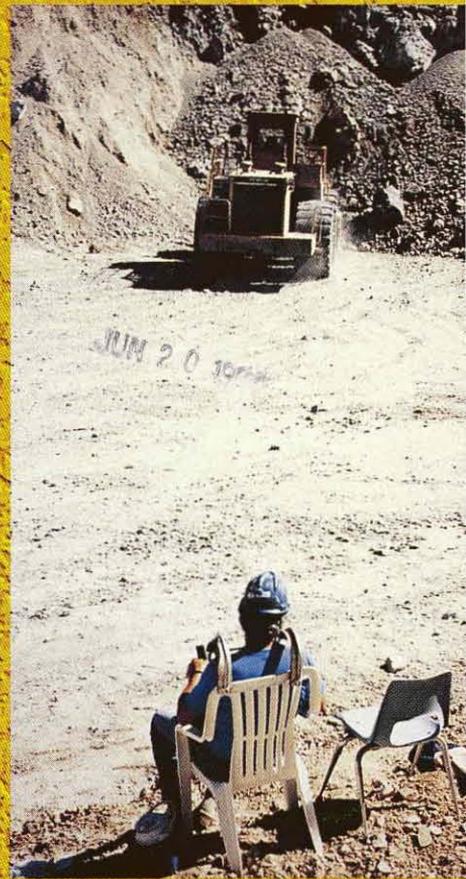
June 1994

# MINING ENGINEERING

A PUBLICATION OF THE SOCIETY FOR MINING, METALLURGY, AND EXPLORATION, INC.

## High Tech Surface Mining

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## DEPARTMENTS

- 486 The drift of things
- 488 Washington survey
- 489 President's page
- 490 Professional registration
- 491 GEM facts
- 494 Industry newswatch
- 551 New products
- 555 Reader service card
- 573 SME news
- 575 In the aggregate
- 577 Rock in the box
- 578 New books
- 580 Personal news
- 581 Employment
- 582 Membership
- 582 Classified ads
- 583 Professional services
- 592 Index of advertisers

## HIGH TECH SURFACE MINING

- 503 Radio remote control mining at Cyprus Sierrita — *G.A. Perry*
- 505 Computer applications in the explosives industry  
*Robert B. Hopler*
- 507 Earthmoving in the information age — *C.L. Schaidle*
- 510 Automating surface mines — *J. Wm. White and L.T. Zoschke*
- 513 New developments in mining truck electronics  
*Ralph A. MacMillan*
- 516 Computers: The catalyst for information accessibility  
*Betty L. Gibbs*
- 518 Mining equipment into the 21st century — *John Wiebmer*

## INDUSTRIAL MINERALS REVIEW

Barite .....	523	Lime .....	536
Bauxite and Alumina .....	523	Lithium .....	537
Cement .....	525	Manganese .....	538
Chlorine .....	527	Nitrogen compounds .....	538
Chromite .....	527	Phosphate rock .....	539
Clays .....	529	Potash .....	540
Construction aggregates .....	530	Pumice and pumicite .....	542
Dimension stone .....	531	Rare earths .....	543
Feldspar and .....		Salt .....	545
Nepheline syenite .....	532	Soda ash .....	546
Fluorspar .....	532	Sodium sulfate .....	547
Garnet .....	533	Strontium .....	547
Gems .....	534	Sulfur .....	548
Graphite .....	535	Titanium .....	549
Gypsum .....	535	Transportation .....	550

## TECHNICAL PAPERS (peer reviewed and approved)

- 557 1994 Jackling Lecture: Mining geostatistics — forty years passed. What lies ahead? — *Jean-Michel Rendu*
- 559 Simplified cost models for prefeasibility mineral evaluations  
*T.W. Camm*
- 563 North American sulfur market: Structure and outlook  
*N. Edmonson*
- 568 Electrowinning of gold and silver from copper-bearing cyanide solutions  
*F.H. NeHL, J.E. Murphy, G.B. Atkinson and L.A. Walters*

### COVER —

This issue looks at trends in surface mining equipment development, beginning on page 503. And, as in each June, **ME** also reviews what happened the previous year in the industrial minerals industry. The review begins on page 523.

### THANK YOU

**ME** editors thank the authors and contributors who made possible the high tech surface mining and the industrial minerals review sections. We appreciate your help. **ME** readers should benefit from your efforts.

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Russian metal imports in 1993. These trade contracts were expected to provide short-term relief to Hungary's struggling bauxite and alumina industries.

Alcoa signed a joint venture agreement with India's Associated Cement Companies Ltd. (ACC) to manufacture and market raw materials for the Indian refractories and ceramic industries. The partners plan to build a facility in Falta, in West Bengal. The plant will be capable of producing 10 kt/a (11,000 stpy) of tabular alumina and magnesium aluminate spinel aggregates when it goes into operation in mid-1994.

Indian Aluminum Co. (Indal) and Tata Industries joined with Norsk Hydro of Norway to create an export company. The new company will build an alumina plant with an installed capacity of 1 Mt/a (1.1 million stpy) in India's eastern state of Orissa. The facility will be based on Alcan and Alusuisse technology. It will cost about \$774.2 million and will come onstream in 1998.

Indonesia has plans to join the alumina industry. The government entered into a joint venture to study the feasibility of building a 900-kt/a (990,000 stpy) alumina plant on Bintan Island in the Riau Archipelago. This is a reactivation of a project begun in the early 1980s.

In Jamaica, alumina output at Jamalco increased to 700 kt/a (770,000 stpy) and will be expanded to 1 Mt/a (1.1 million stpy) in 1994. Jamalco is a joint venture of Alcoa and the Jamaican government.

Saudi Arabia reported identification of additional bauxite reserves near Az Zabirah in the northern part of the country. Bauxite occurrences in this area were evaluated in the late 1970s and early 1980s.

The Gulf Organization for Industrial Consulting (GOIC) attempted to attract financial interests in Saudi Arabia and the United Arab Emirates to develop the region's first alumina plant. Presently, the majority of the region's alumina requirements are supplied by Australia.

Royal Dutch/Shell entered into discussions with South Africa's Gencor Ltd. to buy the major portion of the metals assets owned by both companies within the Royal Dutch/Shell Group. Gencor reportedly has expressed a specific interest in the aluminum assets that Royal Dutch/Shell holds in Australia, Brazil and Suriname. They comprise various joint venture holdings in bauxite and alumina operations.

In February 1993, Suriname Aluminum Co. (Suralco) declared a *force majeure* on alumina shipments due to an

unexpected labor action at its Paranam operations. The union and company management were able to reach an agreement in about two weeks and the *force majeure* was lifted.

In 1993, Billition Maatschappij Suriname began mining the Accaribo bauxite deposit near Paranam.

A second United Nations Conference on Trade and Development ad hoc review meeting on bauxite was held in April. The purpose of the conference was to provide the world's bauxite producing countries with a forum to discuss the need for a producer-consumer dialog. The meeting focused on the need for improved market transparency, especially improved statistical data, particularly regarding the former Soviet Union.

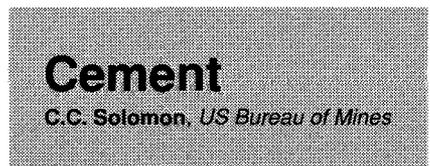
By mid-1993, reports indicated that Venezuela's CVG intended to merge its aluminum holdings into a single operating company. The holdings include Bauxiven, Interalumina and Venalum.

ICF Kaiser Engineers was awarded a nine-month, \$1 million contract to conduct a feasibility study for expanding CVG Interalumina's alumina plant at Puerto Ordaz, Venezuela. The plan is to expand capacity to 3 Mt/a (3.3 million stpy).

In 1993, metallurgical grade bauxite and alumina markets were weakened by an oversupply in primary aluminum. This was provoked by substantial exports from the former Soviet Union and excess primary metal capacity in the western world.

In the short-term, the outlook for the metallurgical consumers of bauxite and alumina looks gloomy. Non-metallurgical, though, consumers are expected to provide the fastest growing markets in the 1990s.

In these specialty product areas, it is projected that bauxite and alumina will lose some market share in the refractory and abrasive sectors but gain in the ceramics and plastics markets. ♦



US consumption of portland cement climbed 4% from 75 Mt (82 million st) in 1992 to 78 Mt (86 million st) in 1993.

While all of 1993 showed an increase in cement consumption, during the first quarter, cement consumption was lower than the first quarter of 1992 due to bad weather. The second and

third quarters showed increases of about 6% over comparable quarters of 1992. The fourth quarter showed the greatest increases. Consumption in November and December increased 23% and 13%, respectively. Some of the increased consumption was attributed to highway construction as well as a jump in housing starts linked to lower interest rates.

Cement consumption varied throughout the country. Montana showed an 80% gain, with New Mexico and Colorado posting 22% and 18%, respectively. Mississippi had a 21% increase. Arkansas, Louisiana, Oklahoma and Texas had an average increase of 8.5%. Delaware, Florida, Georgia, Maryland, North Carolina, South Carolina, Virginia and West Virginia increased cement shipments on average by 7.2%. Hawaii and California cement consumption declined 14% and 4%, respectively.

As the demand for cement increased in 1993, imports of cement and clinker increased by 14% from 6.17 Mt (6.8 million st) in 1992 to 7.08 Mt (7.8 million st). Still, that level of imports was only about 45% of the high attained in 1987. The total value of imports in 1993 was \$331.3 million compared to \$297 million in 1992.

Imports accounted for 9% of reported consumption compared to 8% in 1992. Canada, Mexico, Spain and Colombia were the principal sources of imports, accounting for 51%, 11%, 8% and 8%, respectively, of the total.

The Department of Commerce conducted administrative reviews of the anti-dumping orders on gray portland cement clinker from Mexico. Based on an analysis of the rates, the final results were amended on the anti-dumping orders. Resulting anti-dumping margins ranged from 42.74% to 53.26%.

Cement exported from the United States in 1993 was 625 kt (689,000 st). This was 16% lower than in 1992 and about the same as in 1991. Canada received 80%, or 500 kt (550,000 st) of US exports.

Prices increases of about 5% to 10% were instituted by the large cement companies. Before that, prices had remained constant for at least a decade.

#### Foreign cement news

Ciments Francais purchased an additional 10% of Cementos Molins for a total of 35.3%. Heidelberger Zement plans to take over the Belgian firm Cimenteries. Cimenteries owns Calaveras Cement Co. in California and Tilbury Cement in Canada. Lafarge Coppee attained full control of Ashland

Cement, a Spanish cement company in which Lafarge already held 54% stake.

Management and workers, backed by a consortium of Polish banks and foreign investors, offered to purchase the Gorazdze cement works, Poland's largest and most modern cement producer. The works reduced 1.9 Mt (2.1 million st) of cement in 1992 or 11.8% of the country's output.

Onoda Cement Co. of Japan made plans to acquire Chichibu Cement Co. in a stock swap. The move would make Onoda Japan's largest cement producer.

Cementos Mexicanos formed a joint venture company with Mobley Environmental Services to build two fuel-blending plants in Mexico.

The company was to supply alternate fuel for Cementos Mexicanos cement kilns.

### Domestic cement industry

Essroc Materials Inc. acquired the marketing and sales areas of the Midwest Portland Cement Co. Holnam Inc. bought the Box Crow Cement plant in Midlothian, TX for \$91 million.

KRC Aggregates, a subsidiary of MDU Resources Group, Inc., acquired the Alaska Basic Industries, Inc. of Anchorage, AK. Medusa Cement purchased the Demopolis, AL, cement plant and nine terminals from Lafarge Corp. for \$45 million.

Lafarge Corp. planned to restructure and consolidate its 11 regional operating units into six in the cement and construction material lines.

The cement restructuring was divided into western, eastern and US regions with other office locations in Calgary, Montreal, Quebec and Southfield, MI.

The Lehigh Cementon plant in Cementon, NY was slated to close in early 1994. Lone Star Industries Inc. planned to sell its Nazareth, PA cement plant and several joint ventures as part of a bankruptcy plan.

Independent Cement installed \$1.2 million state-of-the-art equipment to reduce dust emissions.

Hercules Cement planned to spend \$35 million to modernize its Stockertown, PA plant to address environmental issues.

Ash Grove Cement Co. was to start burning scrap tires and used oil at its Leamington, UT plant. Lafarge Corp. installed new equipment at the Davenport, IA plant to facilitate the use of waste fuels, such as tires and used plastics.

Early cement shipments in 1994 were

on average 5% higher than in 1993. Demand for cement is expected to out-strip capacity in some regions of the country, such as in the south Atlantic, west-south-central and mountain regions. Imports are forecast to reach 9 Mt (9.9 million st) in 1994 and 12 Mt (13.2 million st) in 1995. ♦

## Chlorine

R.E. Shamel,  
Consulting Services Corp.

US chlorine production in 1993 amounted to 10.9 Mt (12 million st). That is a 2.7% increase over 1992 levels. This resulted in a 96% operating rate, based on effective capacity.

Declining chlorine demand for solvents, pulp bleaching and chlorofluorocarbons was more than offset by increased demand for chlorine for PVC plastics, phosgene intermediates for urethanes and ethylene dichloride exports.

Strong demand for chlorine increased the supply of coproduct caustic soda.

At the same time, demand for caustic soda in aluminum and pulp and paper weakened. This led to the development of a temporary oversupply for caustic soda.

### Imports-exports

Because chlorine is difficult to store and transport, it is generally consumed near the point of production. Only a small amount is imported or exported. Imports of about 200 kt/a (220,000 stpy) came mostly from Canada. Exports are only in the range of 30 kt/a (33,000 stpy).

### Uses

The largest use of chlorine is to make ethylene dichloride, an intermediate for vinyl chloride monomer and PVC resins. The second largest use is in the pulp and paper industry as a pulp bleaching agent.

Chlorinated organic chemicals, such as solvents, are the third largest use. That is followed by inorganic chemical uses, including the production of titanium dioxide from titanium tetrachloride.

Hydrochloric acid can be obtained by burning chlorine. Chlorine also remains the best disinfectant for water treatment, although environmental concerns may reduce this use.

Due to unexpectedly strong demand for chlorine and high industry operating rates, contract prices rose from \$60/t

(\$54/st) in January 1993 to about \$155/t (\$140/st) in December 1993.

On the other hand, coproduct caustic soda dropped from about \$220/t (\$200/st) in January to \$125/t (\$113/st) in December.

Thus, the combined price remained at about \$280/t (\$254/st) for those who bought both coproducts.

### Industry news and issues

Environmental pressures are increasing regarding the use of chlorine in pulp bleaching.

Proposed new regulations are expected to dramatically reduce US chlorine consumption in this area. Oxygen delignification, ozone, hydrogen peroxide and chlorine dioxide will be the key replacement products.

### Trends and outlook

With a steady recovery of the US economy expected during 1994, the Gross National Product-driven chloralkali industry should also experience a relatively solid year in terms of overall pricing and production.

Consulting Resources predicted that US chlorine production will likely reach a record of 11.1 Mt (12.2 million st) in 1994.

Longer term, little, if any, growth is expected in US chlorine demand. ♦

## Chromite

J.F. Papp, US Bureau of Mines

Chromite is the only source of chromium for metal alloys and chemicals. It is also itself used in refractories and foundry sand. Chromite is accompanied by various amounts of silicate gangue minerals and is generally beneficiated.

Compositions vary widely, from 22% to 58% Cr<sub>2</sub>O<sub>3</sub>, with the important Cr:Fe ratio varying from 1.5 to 4. Alumina, magnesia and iron oxide are other components. Silica content ranges from 0.5% to 22%. High silica chromites are acceptable for some uses if the chromite is a hard, lump-type and the rest of the chemistry — Cr<sub>2</sub>O<sub>3</sub> content and Cr:Fe ratio — is favorable.

The US has no commercial chromite deposits. It has been 100% import-dependent for many years. World production of chromite in 1992 (latest available data) was about 9.8 kt (10,900 st), a 19% decrease over that of 1991.

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