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MINING ENGINEERING

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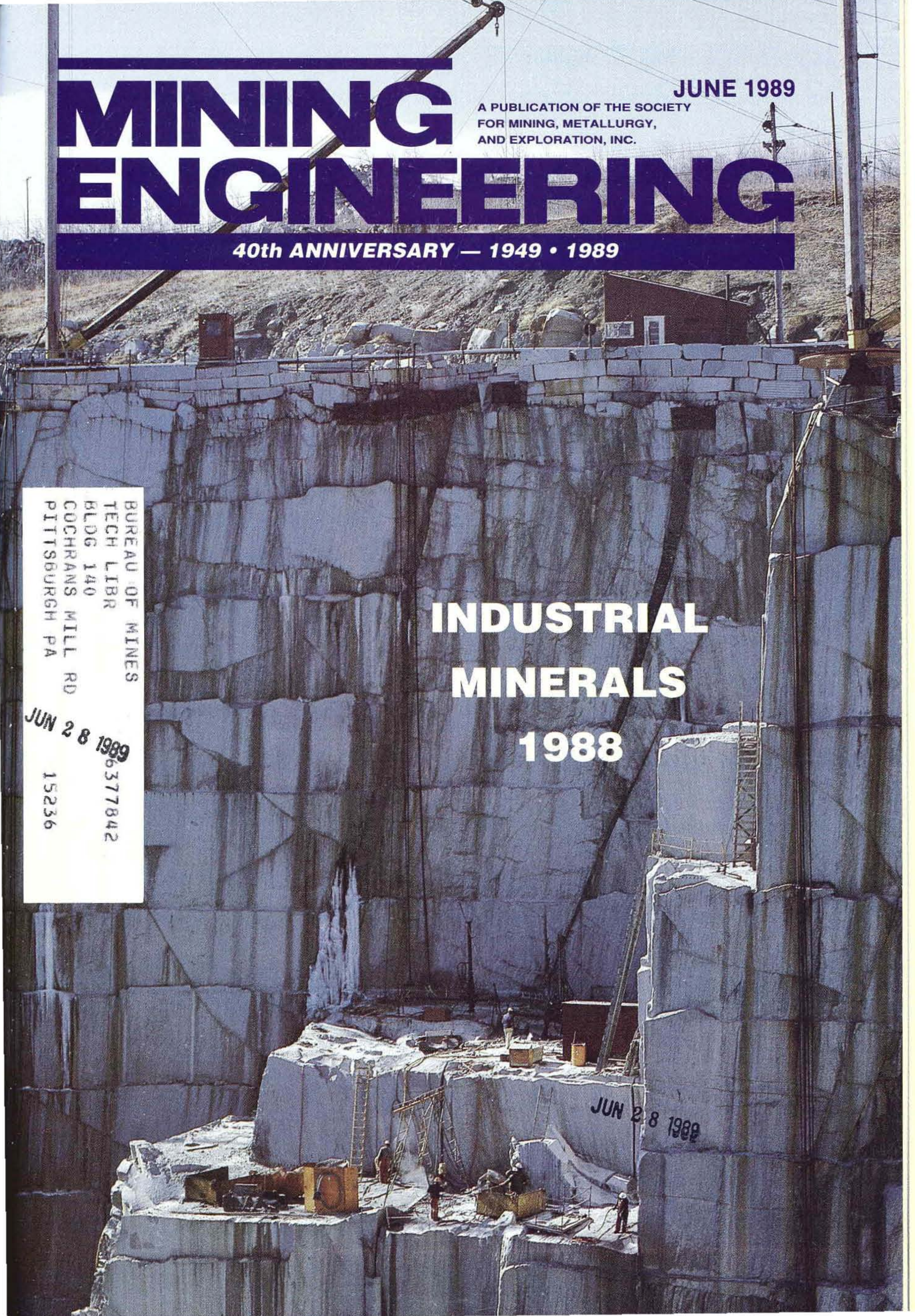

INDUSTRIAL MINERALS 1988

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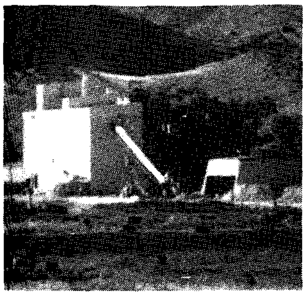

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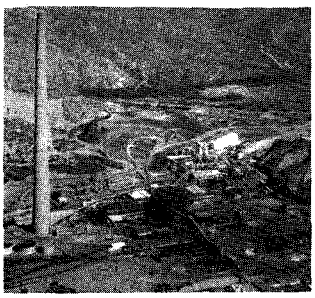

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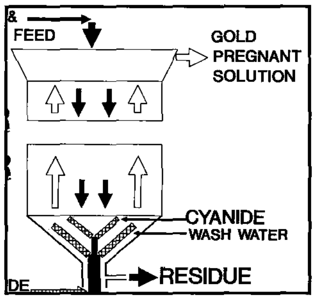

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DEPARTMENTS

COVER

Cover photo is of a granite dimension stone pit in Vermont. Photo is courtesy of Dunn Geoscience Corp. The review of 1988 industrial minerals activity begins on page 399.

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BPA

1988 INDUSTRIAL MINERALS REVIEW

TECHNICAL PAPERS

wire drawing dies and precision turning tools.

Chemical vapor deposition (CVD) of diamond films continues to attract research dollars. These optically clear diamond films show promise as wear surfaces and, due to diamond's excellent thermal conductivity, as heat sinks. The major problem facing researchers of CVD diamond films has been getting the diamond film to adhere to the substrate material. The Norton Co. announced a breakthrough in this area. A separate company was formed to exploit this technology.

The use of polycrystalline diamond (PCD) cutters in mining and oil and gas exploration continues to grow. These cutters are replacing tungsten carbide bits in areas were long bit life and faster penetration can justify the cost of PCD tooling.

Overall, 1989 should be a year of stable prices and slow, but sustained growth for all industrial diamond tools.

Iodine

P.A. Lyday, *US Bureau of Mines*

Three companies in Oklahoma had nameplate capacity to provide about 1.3 kt/a (3 million lbs per year) of crude iodine. During 1988, crude iodine imports were estimated to be 3.2 kt (7 million lbs) with an average cif value of \$16.77/kg (\$7.55 per lb).

Iodine is consumed in animal feed supplements, catalysts, inks and colorants, pharmaceuticals, photographic equipment, sanitary and industrial disinfectants, and stabilizers.

Woodward Iodine Corp. continued to produce iodine from underground brines associated with small amounts of natural gas in Woodward County, OK.

North American Brine Resources operated two miniplants that produced iodine from waste brine associated with crude oil production in Kingfisher County, OK. During 1988, North American drilled four wells and began construction of a facility to produce iodine near Woodward.

IoChem Corp. exported about 18 t/m (40,000 lbs per month) of crude iodine to the Federal Republic of Germany from production at a plant in Vici, OK.

Iodine is a strategic material in the US National Defense Stockpile. On Sept. 29, 1988, the National Defense Authorization Act of 1988 (Public Law 100-456) authorized the disposal of 350 t (772,000 lbs) as payment material for upgrading contracts for stockpiled ferroalloys. The stockpile goal for iodine remained at 2.6 kt (5.8 million lbs) valued at \$51.3 million.

Japan continued to be a major produce of iodine as a byproduct of natural gas production. Seven companies operated plants in Chiba, Miyazaki, and Niigata Prefectures to produce an estimated 7.2 kt (16 million lbs).

Chile is the second largest producer of iodine. It reported production of 3 kt (6.6 million lbs) as a byproduct of nitrate production from caliche in the Atacama Desert.

During 1988, Chile completed facilities to add iodine production capacity during the year by heap leaching tailings. The Puelma plant in the Pampa Del Tamarugal was completed in 1988 with a capacity of more than 136 t (300,000 lbs) of crude iodine. Another project under construction was a plant near Iquique to produce more than 900 t/a (2 million lbs per year) of iodine as a byproduct of nitrate production.

Kaolin

D.W.L. Spry, *ECC America Inc.*

Domestic production of kaolin increased 8% during 1988 to 8.6 Mt (9.5 million st), according to US Bureau of Mines estimates.

Production from Georgia increased 7% in volume to 7.2 Mt (7.9 million st) and 9% in value to \$776 million. There was an 11% increase in production from South Carolina to 747 kt (823,000 st). Value decreased 6% to \$34 million.

Kaolin exports increased to an estimated 2.2 Mt (2.4 million st). Most of the exports originated in Georgia.

Further increases in demand from the paper industry worldwide was responsible for most of kaolin's growth. The kaolin industry in Georgia expanded to meet the demand and supplied a wide range of products to world markets. Further expansions are underway or have been announced by Georgia and overseas producers.

The changing of some paper manufacturing processes from acid to alkaline systems has resulted in opportunities for ground and precipitated calcium carbonate producers at the expense of kaolin. That trend should continue.

Lime

K.A. Gutschick, *National Lime Association*

It appears that total lime output in 1988 gained about 8% over 1987, according to preliminary US Bureau of Mines estimates. Output rose to 15 Mt (16.5 million st). That includes 84% commercial lime and 16% captive lime. This makes 1988 the best year for lime since 1981. However, considering commercial lime alone (deducting refractory dolomite), sales will approximate 12.4 Mt (13.6 million st), making 1988 the fourth best year in history.

Major lime uses, 1987

	(kt)
Steel	4490
Sulfur removal*	1297
Water purification*	1071
Paper and pulp	964
Soil stabilization	674
Copper ore concentration	609
Sugar refining	598
Sewage treatment*	446
Building lime	357
Acid water treatment*	308
Refractory dolomite	256
Calcium carbide	W
Precipitated calcium carbonate	W
Aluminum & bauxite	W
Other ore concentrations	127
Other construction	122
Glass	116
Alkalies	106
Agriculture	80
Tanning	18
Food products	15
Wire drawings	15
All other uses	2135
Total	14182

Source: US Bureau of Mines
Includes open market and capitive lime.
Steel comprises BOF, 82%; electric furnace15%; and open hearth, 3%.
*Environmental uses total 3.1 Mt, or 22% of total.

The 1988 data show that gains were across the board for all sectors except agricultural lime, which declined slightly. Chemical and industrial uses comprise 87% of all lime. This sector gained an estimated 10%. Construction lime increased 5%, while refractory dolomite gained more than 150%. The increases were accounted for not only by steel, but also pulp and paper, gold, copper, aluminum, precipitated calcium carbonate, certain environmental uses, and refractory dolomite.

A noticeable gain is also expected to occur in the use of hydrated lime for asphalt pavements. In this application,