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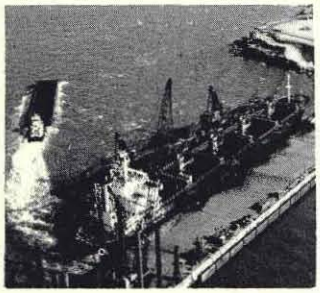

Page 381

Page 395

Page 407

Page 425

DEPARTMENTS

COVER

Cover illustration by freelance artist Bonnie Wiebmer. **MINING ENGINEERING's** 1984 Annual Review begins on page 395.

SPECIAL ISSUE: ANNUAL REVIEW 1984

Iodine

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

US iodine apparent consumption decreased 6% in 1984 to about 3.5 kt (3800 st), valued at $38 million. Three US companies had nameplate capacity to supply about 37% of domestic demand. Iodine remained a government stockpiled commodity, and a small part of the excess was sold during the year.

US Developments

Woodward Iodine Operations, a joint venture between PPG Industries Inc. (51%) and Amoco Production Inc. (49%), was sold to Asahi Glass Co. Ltd., of Tokyo, Japan, on July 12, 1984. The name was changed to Woodward Iodine Corp. Woodward produces crude iodine from underground brines associated with byproduct natural gas at a plant in Woodward, OK. Nameplate capacity of the facility is 900 t/a (1000 stpy).

The Dow Chemical Co. announced plans to phase out its brine products business at Midland, MI, in the next two years and consolidate brine production at its Ludington, MI, and Magnolia, AR, facilities. Iodine occurs in significant quantities only at Midland. Therefore, production of iodine was not expected to continue after 1984. Nameplate iodine capacity at the facility is 227 t/a (250 stpy).

Dow's Midland operations produced bromine, bromine compounds, magnesium compounds, calcium chloride, and iodine. North American Brine Resources operated two miniplants at Dover and Hennessey in Kingfisher County, OK. A third plant was not in production due to lack of brines.

The plants, located at oilfield brine reinjection disposal sites, recovered iodine before the brine was reinjected into the ground. North American is a joint venture among Beard Oil Co. (40%); Godoe USA Inc., a wholly-owned subsidiary of United Resources Industry Co., (50%); and Inorgchem Development Inc. (10%), a wholly-owned subsidiary of Mitsui & Co. (US). Nameplate capacity of the three plants was 159 t/a (175 stpy).

Stockpile and Imports

Iodine is a strategic material in the US National Defense Stockpile. During 1984, the General Services Administration (GSA) sold 63 t (69.5 st) of crude iodine from stockpile excesses. The stockpile goal remained at 2.6 kt (2900 st).

Of the 3.4-kt (3700-st) inventory at year-end, none was authorized for disposal. The defense authorization legislation, debated in Congress, inadvertently failed to include iodine under the 1985 disposal authorization bill. The GSA suspended bids in October pending outcome of the legislation.

Iodine imports decreased during 1984 to about 2.5 kt (2750 st). An Average value of $10.54/kg ($4.78 per lb) was the lowest value since 1980. Japan (74%) and Chile (22%) were the major sources of US imports. These two countries supplied about 70% of US demand.

It is difficult to establish an accurate pattern of demand by market. This is because iodine frequently is converted to intermediate compounds and marketed as such before reaching its ultimate end use. Major iodine uses included pharmaceuticals, animal feed supplements, catalysts, stabilizers, inks and colorants, photographic supplies, and disinfectants.

Foreign Developments

World iodine production for 1984 was estimated at 13.2 kt (14,550 st), including nameplate capacity in the US. World producers and their relative production included Japan (52%), Chile (20%), the USSR (15%), the US (10%), and China (3%).

In Japan, the world's largest iodine producing country, six companies operated 17 plants. Total production capacity was 9 kt/a (10,000 stpy). All production was from subsurface brines, recovered as a byproduct of natural gas production. The Kanto Gasfield of Chiba, Tokyo, and Kanagawa Prefectures were the major source of the brine.

In Chile, crude iodine was produced at two mines, Pedro de Valdivia and Maria Elena, both operated by Sociedad Quimica y Minera de Chile. Production was a coproduct of caliche nitrate production. Production decreased last year because of unusual weather conditions in the Atacama Desert. It is expected to increase significantly during 1985.

Outlook

The new Japanese owner of Woodward is expected to increase production at the facility. Technology improvements are expected to offset production losses from the closure of the facility of the second largest domestic producer.

Demand for iodine was projected to increase from the 3 kt (3450 st) 1982 base at an average annual 0.5% rate through 1990. It is estimated that in 1985, US apparent consumption will be 3.4 kt (3800 st). Prices of crude iodine began to rise during the last quarter of 1984 and were expected to increase during 1985. ■

Industrial Diamond

O. R. Bergmann,
E.I. DuPont de Nemours and Co.

Industrial diamond production and consumption can best be described in terms of worldwide trends. The industry is characterized by an interwoven network of international distribution channels. Industrial diamond frequently is shipped from the country of origin to other locations in the world for processing into specialized products.

The final product often crosses two or more national borders before it reaches the point of consumption. This is because shipping costs are a minor fraction of total product cost.

Worldwide industrial diamond production in 1983 was about 235 million carats (1 carat = 0.2 grams). Of this, 200 million carats were synthetic diamond and 35 million carats were natural diamond.

Synthetic diamond increasingly dominates all market segments of the industrial diamond market with the exception of "Stones" for drill bits and certain other specialized applications. Most of the synthetic diamond is produced by General Electric Co. (US), De Beers (UK and South Africa) and by Tomei (Japan), using the static-high pressure synthesis technique developed by General Electric during the mid-1950's.

Several million carats of synthetic diamond powder per year are produced by the Du Pont Co. in the US. This is done with a patented process that uses the super-high pressures generated during the detonation of large charges of chemical explosives to synthesize diamond from graphite. Diamond powder made by the explosive shock synthesis route has firmly established itself as a specialty superabrasive, having superior polishing and lapping performance on hard materials compared to other types of diamond. ■