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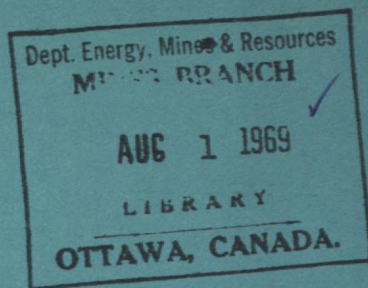
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MINES BRANCH

DEPARTMENT OF MINES

OTTAWA, CANADA

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ZINC DUST CONSUMPTION AT CANADIAN GOLD MINES

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ZINC DUST CONSUMPTION AT CANADIAN GOLD MINES

By

A. Buisson\*

The commercial production of zinc dust in Canada began only a few years ago and has already increased to about 100 tons a year, which quantity represents about 40 per cent of the present apparent Canadian consumption in the gold treatment plants. The only Canadian producer of commercial zinc dust is the Watts Chemical Company with plant in Toronto.

Over 95 per cent of the Canadian production is consumed as a precipitant of gold in the cyanide process, the other 3 to 5 per cent being used in the dyeing and the chemical industries and in the sherardizing process and the total amount used would probably not exceed 50,000 pounds per year.

The consumption of zinc dust at the Canadian gold treatment plants amounted in 1932 to approximately 523,000 pounds as against 431,000 pounds in 1931. The present monthly consumption is at the rate of 45,000 pounds.

The consumption of zinc dust per ton of ore milled varies from a minimum of 0.043 pound to a maximum of 0.330 pound, or an

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\*Mining Engineer, Division of Mineral Resources.

average of about 0.122 pound. These figures of consumption per unit do not include the consumption at the McIntyre, and Granada mines, where the concentrates only are cyanided, or at the Flin Flon where flotation tailings are cyanided.

The commercial production in the United States began in 1910 and is now about 18,000,000 pounds a year.

The imports of zinc dust, as given by the Department of Trade and Commerce, amounted to 527,641 pounds, valued at \$40,032 or 7.59 cents per pound in 1931, as against 506,670 pounds valued at \$37,853 or 7.47 cents per pound in 1930. The imports for the year 1932 approximated 510,000 pounds.

The cost of zinc dust at the mine as reported by the operators varies from a minimum of 8 cents to a maximum of 15 cents per pound, the average cost being approximately 11 cents per pound.

Zinc dust varies in composition, but on the average contains about 90 per cent of metallic zinc and 10 per cent of zinc oxide, the latter occurring as a film on the surface of the metallic particles.

In the early years of the cyanide process zinc shavings were principally used as a precipitant of gold. A number of other methods have been tried such as precipitation by charcoal, aluminium and by electrical precipitation, but in recent years the Merrill-Crowe combination process has been adopted in most new mills erected in Canada. This well-known process of de-oxidizing the solution and precipitating the gold by the addition of zinc dust, assures a fairly uniform product for refining. Introduction of Merrill-Crowe process of de-oxidization and zinc dust precipitation besides giving more refined bullion decreased considerably the zinc consumption over old zinc shaving methods, lowered the cyanide consumption and gave more complete precipitation of gold from solutions. At some of the plants, small quantities of lead acetate or lead nitrate are added to the solution to intensify the action.

Three distinct methods of precipitating silver have been used in the cyanidation of the silver ores at Cobalt, Ontario: (a) precipitation with zinc; (b) precipitation with aluminium; and (c) precipitation with sodium sulphide. The use of zinc as a precipitant in a solution containing appreciable amounts of arsenic and antimony, was found to be very unsatisfactory and was discontinued. In addition

to causing a heavy consumption of cyanide, the zinc fouled the solution, resulting in a marked decrease in dissolving efficiency.

Precipitation with aluminium dust was first developed by the O'Brien Company at the Deloro smelter, Deloro, Ontario, and later introduced at their Cobalt mill. This method has three advantages in that there is no fouling of solution, a regeneration of cyanide and the recovery of silver as a clean high grade precipitate.

Sodium sulphide precipitation was developed at the Nipissing mill. To the pregnant solution sodium sulphide is added and the resultant precipitate of silver sulphide desulphurized by contact with aluminium ingots in a caustic soda solution.

Zinc dust is being consumed at the following gold mines:-

Ontario: (Porcupine area); Hollinger, McIntyre, Dome, Coniaurum, Vipond and Ankerite.  
(Kirkland Lake area); Lake Shore, Teck-Hughes, Wright-Hargreaves, Sylvanite, Kirkland Lake, Toburn, and Barry-Hollinger.  
(Other areas); Ashley, Howey, Moss, Minto and Parkhill.

Quebec: Granada and Siscoe.

Manitoba: Flin Flon, Central Manitoba, and San Antonio.

British Columbia: Pioneer and Reno.

The survey of the zinc dust situation in Canada has revealed the following facts, which are presented in tabular form:-

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Number of gold mines using zinc dust . . . . .	25
Total tonnage of ore cyanided in 1931 . . . . .	6,310,086 tons
Total present rated daily capacity of the treatment plants	20,895 "
Total present actual daily " " " " "	20,718 "

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Zinc dust consumption:-

Total consumption for 1931 . . . . .	431,000 lb.
" " " 1932 (estimated) . . . . .	523,000 "
Present average monthly consumption . . . . .	45,000 "

Consumption by areas (at Gold Mines):-

	<u>1931</u>	<u>1932</u>
Ontario . . . . .	365,945 lb.	406,100 lb.
Quebec . . . . .	4,114 "	4,500 "
Manitoba . . . . .	46,339 "	89,500 "
British Columbia . . . . .	<u>14,500</u> "	<u>22,800</u> "
CANADA . . . . .	<u>430,918</u> "	<u>522,900</u> "

Lowest reported consumption per ton of ore . . . . .	0.043 lb.
Highest " " " " " " . . . . .	0.33 "
Average " " " " " " (approx.) . . . . .	0.122 "

Lowest reported consumption per ton of solution . . . . .	0.023 "
Highest " " " " " " . . . . .	0.15 "
Average " " " " " " (approx.) . . . . .	0.48 "

These figures of consumption per unit do not include the consumption at the McIntyre, and Granada mines, where the concentrates only are cyanided, or at the Flin Flon where flotation tailings are cyanided.

Maximum cost of zinc dust, per lb. (at the mine) . . . . .	15.0¢
Minimum " " " " " " " " " " . . . . .	8.0¢
Average " " " " " " (approx.) . . . . .	11.0¢

IMPORTS OF ZINC DUST INTO CANADA (a)

Year	Quantity	Value	Average value per pound	Price of Zinc per pound.*
	lb.	\$	¢	¢
1920	378,556	50,597	13.366	9.558
1921	434,981	46,440	10.676	6.509
1922	313,652	27,390	8.733	7.210
1923	394,378	41,167	10.438	8.267
1924	359,219	30,668	8.537	7.837
1925	315,440	28,664	9.087	9.060
1926	435,440	46,800	10.747	8.825
1927	339,055	34,110	10.060	7.710
1928	458,923	44,906	9.785	7.144
1929	483,192	38,891	8.049	6.870
1930	506,670	37,853	7.471	5.084
1931	403,850	29,414	7.283	3.961

(a) Mineral Production of Canada, 1920-26, and Trade of Canada, 1927-31.

(\*) Montreal quotations.

PRODUCER OF ZINC DUST IN CANADA

Watts Chemical Company, Toronto.

PRODUCERS OF ZINC DUST IN THE UNITED STATES.  
IN 1930 (b)

The Alloys Company . . . . . San Francisco, Cal.  
 American Smelting & Refining Co. . . . . Sand Springs, Ohio.  
 Federated Metals Corporation . . . . . Trenton, N.J.  
 John Finn Metal Works . . . . . San Francisco, Cal.  
 Grasselli Chemical Co. . . . . Meadowbrook, W.Va.  
 New Jersey Zinc Co. . . . . Palmerton, Pa.  
 Superior Zinc Corporation . . . . . Philadelphia, Pa.

(b) "Zinc in 1930", by Elmer W. Pehrson, (1:8, p. 440) U.S. Bureau of Mines.

WORLD PRODUCTION OF ZINC DUST<sup>(c)</sup>  
(In tons of 2,000 lb.)

COUNTRY	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
United States.	6,131	7,145	7,726	8,314	7,994	8,098	9,172	11,050	9,237	10,500
Belgium.	3,219	5,324	3,693	2,831	4,719	5,346	4,442	4,255	2,822	2,200
Poland..	4,038	5,421	4,920	3,739	5,967	9,446	8,975	8,579	7,855	8,830
Germany.	(Figures not available.....)							4,400	3,200	2,400

(c) Year Book of the American Bureau of Metal Statistics, (1931), N.Y.

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REPORT ON THE PROGRESS OF THE WORK  
FOR THE YEAR 1907

NAME	AGE	SEX	RELATION	EDUCATION	INDUSTRY	REMARKS
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