Frederick H. Reid was born in Seattle and attended the University of California and Columbia University. He commenced his long mining career as a surveyor for Coniagas Mines at Cobalt in 1920 and remained with that company until 1928 progressively as engineer, chief engineer, mill superintendent, assistant manager, and superintendent of external mining operations. Specializing in metallurgy and materials-handling facilities, he was also connected during that period with the following: Right of Way Mines, Chambers-Ferland Mines, Green Meehan Mines, Four Nations Gold Mines, the Town of Cobalt, Sherwin-Williams Co., Carborundum Co., and Keeley Silver Mines.

From 1928 to 1933, he was managing director of Commercial Airways of Edmonton and Rutledge Airways of Calgary, and in this capacity was involved in the early transportation to Gilbert LaBine's discovery at Great Bear Lake. In 1933 he founded "The Mining Analyst" and for the following 8 years published up-to-date information "devoted to the development of mining in Canada". He founded and financed McKay (Quebec) Exploration Co., a leader in the Chibougamau District. He participated in the formation of the Canadian Metal Mining Association, now The Mining Association of Canada.

Frederick H. Reid

Mr. Reid provided funds, engineered operations, and selected directors in a successful effort to resurrect Labrador Mining & Exploration Co. from bankruptcy, when it faced the loss of a 20,000-square-mile concession in Labrador. He compiled the final report which interested Hollinger Consolidated Gold Mines and major U.S. steel companies in gaining control. He was director and consulting engineer for Labrador from 1937 to 1942.

He was persuaded by the late George C. Bateman, then metals controller for Canada, to re-open the Vancouver Island copper-zinc mine of Tyee Consolidated Mines, which obtained some wartime production as Twin 'J' Mines at Mount Sicker. In September 1968 he assumed control of Lexington Mines as president and managing director.

He is a Life Member of the Canadian Institute of Mining and Metallurgy and of the Association of Professional Engineers of Ontario.

THE GREENWOOD AREA

By FREDERICK H. REID, P. Eng.

A total production exceeding 26 million tons of ore has been recorded for the Greenwood Area since the camp came to life in 1891, when prospectors discovered outcrops carrying substantial amounts of gold, silver, and copper. The customary sequence of individuals, groups, syndicates and in course of time, small companies seeking the gifts of nature, created the core of what in time was described as the Copper Belt of British Columbia. Erection of smelters at Boundary Falls, Greenwood, and Grand Forks provided near and relatively cheap transformation of cobbed ores and concentrates into the means for survival. Production reached a peak in 1913 but by 1919 labour troubles resulted in closure of the smelters and a majority of the operations. During this first cycle the principal producers were Phoenix (Granby), No. 7 (Cominco), and City of Paris and Mabel (Lexington). Immediately south of the International Border substantial output was gained from the Lone Star mine.

Reliable data for the period 1891 to 1969 records production from the principal operations in the Greenwood Area are noted below:

Mine	Period	Tons Treated	Output			
			Gold-Oz.	Silver-Oz.	Copper-Lb.	Lead-Zinc-lb.
Phoenix	1900-42	13,724,774	640,074	3,843,912	312,000,646	---
	1959-69	6,365,670	124,000	752,949	77,083,650	---
Motherlode	1900-20	3,772,723	159,349	632,652	70,101,047	---
	1957-62	543,895	13,973	55,562	6,874,469	---
Union	1913-46	158,680	55,098	1,379,962	27,922	1,007,834
Brooklyn-S	1900-49	329,225	27,404	110,028	7,819,517	---
Rawhide	1904-16	943,218	33,941	222,149	18,610,304	---
Snow Shoe	1900-11	600,904	41,282	159,147	13,937,892	---
High-Bell	1936-69	302,616	7,901	19,575,402	---	30,855,613
Sunset	1900-18	120,489	4,649	24,015	1,910,265	---
Providence	1893-52	11,491	5,888	1,367,503	---	658,388
Emma	1901-21	254,597	6,804	78,065	5,132,118	---
Number 7	1901-45	15,152	2,971	99,987	---	213,936
B.C. Eholt	1900-19	103,476	1,002	214,275	9,025,707	---
Oro Denoro	1903-17	136,447	3,744	30,652	3,727,194	---
Lexington	1900-40	2,124	856	4,480	133,137	---
Lone Star*	1900-19	---	5,878	31,795	4,039,717	---

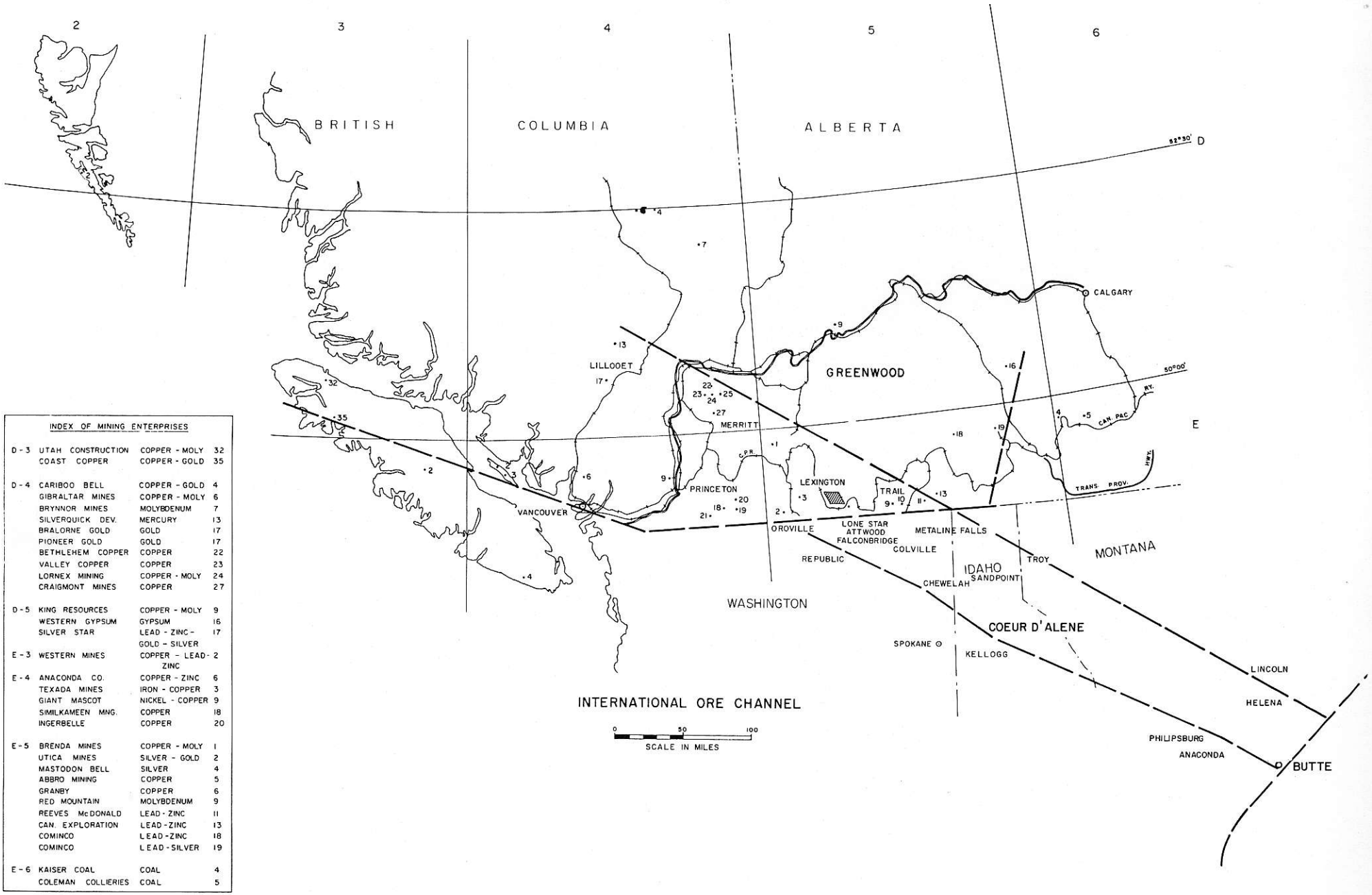
* Immediately across Border, on U. S. side.

Subsequently, the area experienced a period of quiescence due to lack of local smelting facilities, the onerous demands of war, and the departure of the prospecting element for distant fields which might offer other metals of higher value. Exploration and production for the cycle from 1919 to 1959 was of relatively minor extent. However, the promise of higher prices for copper occasioned renewed exploration and development of promising properties which had laid dormant for decades.

Resumption of production in 1959 by the Phoenix mine with a milling rate of 700 tons daily, increased to 1,500 tons in 1962, to 2,000 tons in 1963, and currently reported at 2,750 tons daily, undoubtedly was responsible for a new trend of thought with respect to exploration and development in British Columbia. It had been established as fact that copper deposition was widespread and it became evident that the low-metal content thereof demanded revolutionary changes in methods of mining, size of reduction plant, and magnitude of financing.

Resulting was a new and propitious era of mineral production for the whole Province of British Columbia as may be noted be noted on page 47.

Returning to the Greenwood District, extensive exploration and diamond drilling over the past two years by Lexington Mines Ltd. has traced a zone of mineralization for a length of 1,300 feet. Intersections encountered



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Company	Production Commenced	Daily Mill rate	Copper content % ore reserves	Current daily milling rate	Ore Reserves in tons
Craigmont	Nov-1961	5,000 tons	1.74% (1)	6,000 tons	17,939,000
Bethlehem	Dec-1962	3,300	0.45 (2)	14,000	55,000,000
Highmont	1972 *	---	0.420 (3)	---	135,000,000
Valley Cop.	1973 *	25,000	0.46 (4)	---	900,000,000
Lornex	1972	38,000	0.427 (5)	---	293,000,000
Brenda	Feb-1970	24,000	0.183 (6)	---	177,000,000
Gibraltar	June 1972	30,000	0.39 (7)	---	206,500,000
Ingerbelle		15,000	0.53	---	76,000,000

* Estimated

(1) Nov. 1, 1969; (2) Feb. 28, 1970; (3) May 1970, indicated; (4) Dec. 1969. indicated potential; (5) 1968; (6) Dec. 31, 1967, plus 0.049% moly. (7) Nov. 7, 1970, plus 0.016 moly.

so far by 11 diamond-drill holes average 0.74% copper, 0.073 oz. gold and 0.121 oz. silver per ton, cutting through an indicated average vertical extent of 63 feet. The apparent horizontal extent is of the order of 180 feet.

This development has established that the great Regional Ore Course, extending from the fabulous Butte, Montana, copper camp, through the major Coeur d'Alene field in Idaho and the important mining areas of Chewelah and Republic in Washington, continues across the International Border and onward through Lexington Mines, the Highland Valley copper greats and, at least as far northwestward as the Bralorne and Pioneer Gold deposits. The predominant metals are copper, gold, and silver.

As a result, the famous Greenwood District has come to life in a forceful manner as may be noted. The following projects indicate the revival of activity:

Aabro Mining & Oils Ltd. — Change of name in 1968 and consolidation of properties, of which Mother Lode and Cumberland are principal components, with sizeable production at various periods up to 1962. At October, 1969, ore reserves reported at 701,378 tons proven and 740,159 probable in the Mother Lode mine with grade of 0.65% copper and a further 792,395 tons of 0.79% in the Greyhound mine. Enlargement of mill to nominal 2,000 tons per day completed and reported operating at rate of 1,800 tons daily in early August, 1970.

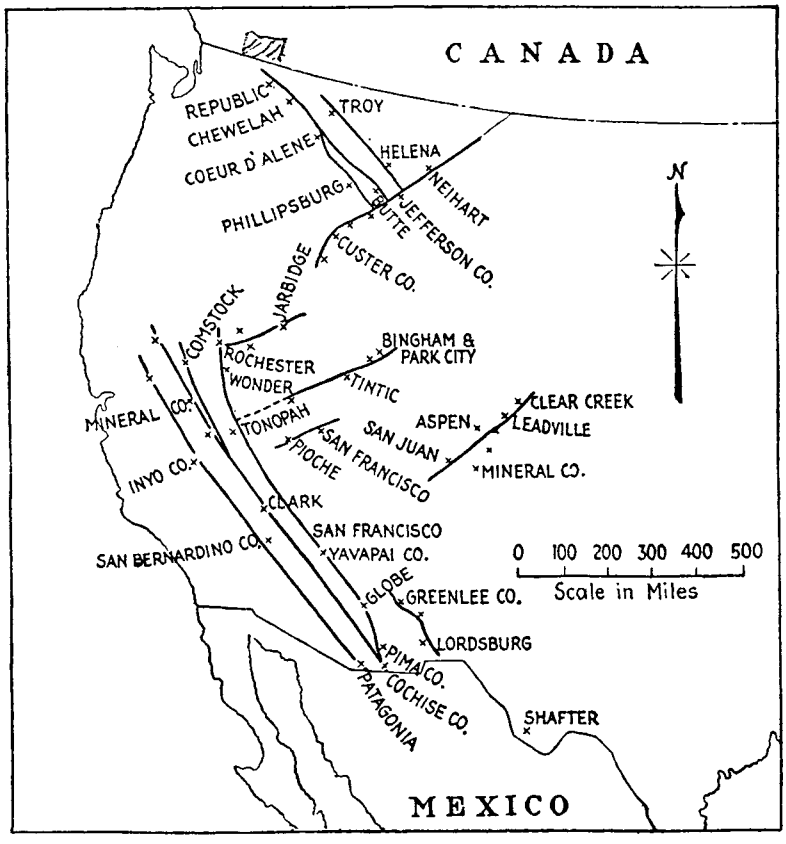

FIG. 75.—Principal silver camps of the Western United States. Based on Plate 48, "World Atlas of Commercial Geology," Part I., U. S. Geol. Surv., 1921. The crosses indicate the principal productive camps in 1918. The lines indicating ore belts or ore channels, and the recognition of the alignment into two systems, northeast and northwest, are my own.

Silver Standard Mines — Holds 80 per cent interest in 18 claims located between Lexington holdings and the International Boundary. During 1967 completed 5 percussion holes over wide area to depth of 300 feet. Reported 40-foot section at bottom of No. 5 Hole assayed 0.82 per cent copper with additional values in gold and silver. Drilling during 1969 stated to have cut good-grade copper over narrow widths. In 1970 has witnessed continued geophysical surveys and a continuation of percussion drilling on 3 claims immediately adjacent to Lexington's south boundary and extending to the International Boundary.

The current programme will test an area one-half mile along the major ore channel between indicated ore on Lexington Mines and proven ore on the Lone Star Mine property 500 feet south of the International Boundary.

International Mogul Mines — Holds a 29 per cent interest in Israel Continental Oil which has optioned the Lone Star mine from Attwood Copper Mines. Development programme is under direction of Mogul and is stated to comprise 9 drill holes peripheral to previous development. Production in the period 1900-1919 has been recorded as 4,039,717 lb. copper, 5,878 oz. gold, and 31,795 oz. silver from 161,440 tons. Surface and underground drilling programmes conducted in 1953-55 are reliably stated to have indicated 200,000 tons grading 2 per cent copper or 600,000 tons of 1 per cent plus copper.

Attwood Copper Mines — Holding 17 patented claims close to the International Border in Washington (which contain the Lone Star mine) is reported to be undertaking exploration in conjunction with International Mogul.

Ortega Minerals — Holding 42 claims and leases has announced an extensive programme comprising megnetometer, geochemical, and induced-polarization surveys, surface stripping and diamond drilling.

Newmont Mining — Through the agency of Canmont Mining Properties has entered into an exploration agreement covering 131 claims held by Kalco Valley Mines Ltd. Property is located a few miles southeast of the Ingerbelle mine of Newmont and will be subjected to induced polarization, geological mapping, trenching, and sampling.

GENERAL GEOLOGY

Minor consideration was given by the writer to repeated requests to assume command of an enterprise created to explore and develop moose pasture in the Greenwood District, in the veritable centre of the copper district of

British Columbia until study of "The Ore Magmas" of Josiah Edward Spurr, renowned geologist of the Western Hemisphere, awakened interest.

Close scrutiny of his Plate No. 48, shown herewith, and application of the same to the mineral map of B.C. aroused interest and the struggle, to bring one more mine into production, was on. Spurr's delineation of the great ore courses of the Northwest follows: "There appears to be a northeast zone of silver production in Montana and Idaho, altogether parallel with that in Colorado, running through Neihart and Butte in Montana, into Custer County in Idaho, and about 300 miles in length . . . This striking belt cuts at right angles across the main ranges of the Rocky Mountains and their subordinate ridges, but is marked in part by isolated domical uplifts, such as that of the Little Rockies.

"Also, there is a northwest belt of production of silver and some gold which runs from the centre of the northeast belt just described, near Butte, through the famous Coeur d'Alene district, to the Republic-Rossland districts on the border between Washington and British Columbia. This trends obliquely across the Rocky Mountain ranges. At the intersection of these two belts is the great copper camp of Butte."

Projection of the latter across the border encompassed numerous mining properties, the odd one successful from a production viewpoint, the major copper mines of the Highland Valley, Bralorne and Pioneer gold mines. Apparently, this was an extension of the series of related ore channels extending from South America to Canada.

Current and proposed plans by major mining companies, fully equipped with the genius and mechanical devices of the present era, should prove or disprove the assumption. Proceeding farther afield, the writer considers the probability that the proliferous system of ore channels could take a more northwesterly course as it approaches the Pacific Ocean and thus extend into the Yukon Territory and the State of Alaska.

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Frederick Reid