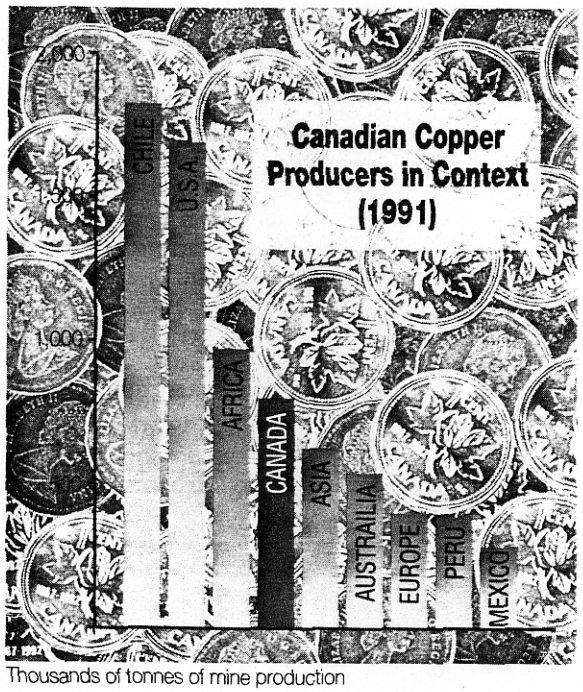
Canada's Copper Challenge

SX-EW will do little to replace Canada's dwindling copper output. What's needed is approvals for already-discovered mines, primarily in British Columbia **By CMJ Staff**

Despite the impossibility of predicting the future, the picture seems to be a relatively bright one for copper. Metal supply is burgeoning. New, high-grade deposits are being developed in Chile, the world's largest producer.

Chilean production has risen from 1.4 million tonnes in 1987 to 1.9 million in 1991 and increases are scheduled for the future. To put this figure into perspective, Western-world mine production totalled 7.4 million tonnes in 1991. The copper industry in the U.S., second only to Chile, has undergone a revival. Production there has risen to 1.6 million tonnes from 1.2 million in the same 1987-1991 period. But the important feature of the U.S. upsurge is not so much the increase in overall metal production but rather the improvement in productivity. Productivity in the U.S. has risen from 24 kg of copper per manhour in 1980 to 53 kg in 1991.

Expressed in a different way — with so much copper coming from low-cost producers, only low-cost producers will survive. So where does this leave Canada?



Thousands of tonnes of mine production

Canadian copper producers should be aware of what is going to happen to copper prices; the country needs new production and the industry needs to maintain market share (see page 19). But solvent-extraction-electrowinning is not likely to increase Canadian copper production by any significant amount.

Canada has little to fear, however. Besides state-of-the-art smelter practice, nature has loaded the dice in Canada's favour. With the exceptions of Highland Valley Copper, Gibraltar, Island Copper and Princeton Mining, all in British Columbia, and Gaspe Copper in Quebec, Canadian copper is derived from polymetallic deposits. Because of this factor zinc and precious metals underwrite the cost of producing Canadian copper.

In contrast, the porphyry-coppers of Chile, the western United States and B.C. are essentially monomineralic. Excluding limited quantities of by-product molybdenum and precious metals, copper must bear the full costs of production from these deposits. In this scenario, Canada clearly has the advantage.

There are many porphyry coppers at various stages of exploration in British Columbia. Some are in the multi-million-tonne category at copper grades considered commercial elsewhere in North America. According to the market share idea, these deposits should be brought into production so that Canada can maintain or improve its rating on the list of global copper producers. But so what?

The only matter of concern is, how much new wealth will these ore deposits generate? How many new jobs? How much new infrastructure? How many new spin-off services and businesses? How much tax revenue? And how much new cash for the company to distribute to the shareholder and to reinvest?

Incidentally, many of those porphyry coppers were drilled off years ago. That they remain in their pristine state says a lot about what's wrong with base metal mining in Canada.

The two major porphyry-copper mines currently producing in British Columbia — Highland Valley and Gibraltar — have their own strategies for keeping costs at bay. And of the remaining pure Canadian copper mines noted, Island Copper is tentatively scheduled to close in 1996 and Gaspe Copper, in 1998.

Highland Valley has progressively increased mill throughput to a rated 133,000 tonnes per day in 1990 from 72,500 tonnes per day in 1981. Actual production in 1991 was 126,800 tonnes per day. This throughput makes Highland Valley the world's second largest milling operation after Chile's 153,000-tonne-per-day Chuquicamata.

Gibraltar has taken a different tack. In late 1986, after three years of test work, the company introduced technology that is a first for Canada — solvent-extraction-electrowinning, (SX-EW). Besides producing conventional flotation concentrates from its 32,500-tonne-per-day mill Gibraltar now produces cathode copper (an increase in mill capacity is also a future possibility). Nameplate capacity of the SX-EW plant is 4.6 million kg cathode copper per annum, though lower leaching grades are limiting output to about 70% of this figure. Actual production in 1991 was 3.3 million kg cathode, equivalent to 10.4% of Gibraltar's overall production (copper in concentrates plus cathode copper).

Canada's second SX-EW plant is anticipated for the oxide-copper prop-

erty of Williams Creek, Yukon.

SX-EW technology represents approximately 10% of global, primary-copper production and it is well proven technology. The first commercial plant was brought into operation by Ranchers Mining at its Bluebird property in Arizona in 1968.

GIBRALTAR

Despite this fact, Gibraltar broke new ground with SX-EW and took not a few risks.

First, Gibraltar's dumps are not engineered for leaching. They are chaotic piles, no more than conventional waste dumps. They approximate 60 metres in height and contain compacted layers created by their mode of construction in multiple lifts.

Paul Blythe, Gibraltar's mill superintendant.

Second, winter temperatures in the Cariboo often drop to -30° C and -40° C. posing serious problems to the exposed irrigation system.

Third, until the mid-1980s only copper carbonate/oxide/silicate ores were thought to be suitable for sulphuric acid leaching. Then, in 1987, Soc. Min. Pudahuel (a Chilean company) and Rio Algom jointly developed a process for leaching chalcocite ores. Despite success with chalcocite, chalcopyrite is a structurally complex mineral and does not respond well to known acid/bacterial techniques.

So far as Gibraltar is concerned, apart from a thin capping of oxidized material that originally overlay the orebody, and the thin film of superficial alteration which has developed since the mineralized rock was blasted in the pit, Gibraltar's ore is essentially chalcopyrite. Overall recoveries are consequently low at about 40% copper.

Canadian Copper Production in 1991

Highland Valley	171.63	Goldstream	9.80
Kidd Creek	116.38	Ajax	7.75
Inco (Ont. and Man.)	110.67	Brunswick	6.01
Island Copper	64.00	Opemiska	5.71
Falconbridge (Sudbury)	34.22	Bousquet #2	5.15
Ansil	32.07	Equity Silver	4.93
Gibraltar	28.75	Cu Rand & Portage	4.25
Bell	25.50	Mobrun	3.58
Gaspe Copper	25.08	Winston Lake	3.43
Flin Flon–Snow Lake	20.00	Gibraltar	3.33
Selbaie A–2 & B	17.339	Heath Steele	3.12
Myra Falls (HW & Lynx)	15.60	Matagami (Norita & Isle Dieu)	2.68
Geco	15.28	LaRonde	1.75
Ruttan	15.00	Samatosum	1.15
Similkameen	14.48	Estrades	1.00
Selbaie A–1 Zone	13.17	Joe Mann	0.68
Namew Lake	12.00	Lyon Lake	0.24
Trout Lake	12.00	**Total** (thousands of tonnes)	**799.84**

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