



A Perfect Storm for Copper



By John Loofbourow, MD

AT THE CENTER OF WORLD'S LARGEST underground copper mine, *El Teniente*, is a huge rock crusher. It is controlled by a very ordinary looking man sitting before five TV screens, each revealing part of the rock crushing operation: Gravitational feeding of mined rock from the stopes into ore cars; movement and dumping of cars onto conveyor belts; the disgorgement of the rocks into the crusher; and the operation of the huge pestle-like crusher itself.

As I watch it strikes me that there are no really ordinary people in this world. He manipulates seven cameras with a keyboard, changing the view, making remote adjustments.

In this relatively litigious-innocent part of the world, I am allowed to stand behind him and talk with him as he works. I have listened to a lecture on safety, am dressed in some 40 pounds of miner's regalia: hard hat, hearing protection, electric torch, respirator with CO filter to be used in case of fire, hard toed rubber boots, and rain gear.

Within the mountain are some 2,500 kilometers of lighted tunnels with traffic lights at intersections and turnouts in between. Fresh air is pumped in continuously. It is wintertime so at this altitude there is little water deep in the mountain; it has frozen at the surface where a blizzard rages, product of a cold front from the south. There is flooding in the Rancagua Valley below.

To reach the crusher one must drive to the fourth level of the mine (there are now 8 of a projected 20). The crushing operation is at a point about one and one half kilometers below the snow capped mountain peak, and three kilometers into the mountain from the entrance. My video camera vainly tries to suck in the sights and the noise, unable to fully capture the feel or the scope of the place.

I close the doors to the control room, which cuts down the noise but not the seismic vibrations of the crusher, as it throws off fine dust and sparks while working its will with the ore. The operator recites large numbers, which I forget: how many hundreds of thousands of tons are processed and how much copper is produced daily. He works an 8 hour shift four days a week and lives in Rancagua a half hour drive down hill from the mine entrance. At the price of copper today the mine operates 24 hours a day, year round.

At lunchtime I'm allowed to remove my lamp and hard hat, to eat in the miners' dining hall nearby. It's cafeteria style, plain but nourishing. The miners' wages are between two and three times those of the average worker of similar risk, training or skill. They are provided full medical coverage as are their families, and a substantial retirement.

Education costs for children are paid, including college for those who qualify although the qualifying examinations are rigorously competitive. Housing is also a benefit, with an option to buy at convenient prices and terms, or to use a subsidy to buy elsewhere. Not many Chilean workers have such extensive benefits.

Afterwards I visit Sewell, the abandoned town where El Teniente miners once lived. The mine became so large that it was socially and economically preferable to allow the families to live in the town of Rancagua, and bus miners back and forth. Situated on a small hill in the center of a narrow valley, near the original entrance to the mine, it was recently named a UN World Heritage Site.

The day has warmed and a thick blanket of brilliant fresh snow begins to soften. Bunkhouses, residences, shops, and the old mill line narrow cement and stone pathways on the conical hill. A bowling alley, the first in Chile, and the movie house had separate (preferential) hours for *norteamericanos* and administrators.

It was a company town like those I lived in as a child, but much larger. The voices of its 1,500 residents echo down the years in this small valley between two eroded avalanche prone ridges. It is picturesque today, set like a jewel in the snow white and rocky red Andes stillness, serene and romantic, any ugliness of times past covered by the snows of time.

More than 1,000 kilometers in the desert north lies *Chuquicamata*, world's largest open pit copper mine, like El Teniente, originally a North American mine in operation since the very early 1900s. Now it is owned by the Chilean government. Both produce copper and modest amounts of other metals like gold and molybdenum. In an open pit mine, the overburden of rock must be removed to reach the ore bearing vein. Here the waste rock is now a man-made mountain range hundreds of feet high, surrounding the ever growing pit.

Within a few kilometers of the pit is the town of Chuquicamata. Until a few years ago some 30,000 miners and their families lived there. But the mine grew until the dumping of waste rock began to engulf the town itself. Moreover, dust from heavy modern equipment and the toxic gasses from an ever more active nearby foundry became problematic. So, like Sewell, the town is being abandoned. Many houses, the gymnasium, and the hospital are already buried under millions of tons of waste rock. The hospital, once said to be the most modern in Chile, acquired the first CAT scanner in the country.

The streets are deserted, except for an occasional soul, a vehicle or a tourist bus. The old company store peers out across an empty paved street. Its fading sign reads *pulperia* because *pulpo* means octopus; eight arms, it is said, took all the miners earned. Nearby are neglected empty schools, movie houses, shops, administrative buildings, dusty gymnasiums, and silent *fútbol* (soccer) fields. A gargantuan rusting mechanical shovel sits in the central square. Visitors climb into the scoop for picture taking.

Resettlement of the miners, about 15 km to the south, in Calama, consists mainly of large tracts of modest but solid modern homes. Miners have the option to buy their homes or use the subsidy to purchase other houses; they generally prefer the newer better appointed models with new appliances.

The open pit is an enormous ovoid hole rather like El Teniente mine turned inside out, the rocky outline of an upside down wedding cake one kilometer deep, five kilometers long and three kilometers wide. From the observation deck, one sees a mechanical shovel dumping 110,000 metric tons of rock into a truck, 25 to 30 metric tons at a time. Both truck and shovel are miniaturized in the distance. A dozen identical trucks, each several stories high, crawl slowly up and down the spiral road, which is constantly watered to keep dust down. Soon there will be no truck drivers; at a nearby open pit mine all the trucks are satellite operated.

Deep in the pit the dark colored copper-bearing ore vein is visible stretching for 5 kilometers generally north/southward. "*Chuqui*" is expected to operate for another 25 years as an open pit, then will be converted to an underground mine, because the cost of operation will become prohibitive, requiring too much energy to continue hauling not only the ore, but the waste rock to the top of this huge manmade oval mountain range. There is enough proven copper in the ore vein to operate the mine for another 70 years thereafter.

I am the son of a miner, raised in a dozen little mining towns, so I have the magic, the tears, sweat, and lore of mines in my marrow. Few excepting those who work in mines are aware of the effort and expense, or even the blood that is shed to steal metal from the earth's womb.

Yet there is a significant relationship between metals and the world economy that affects us all. Recently, world events have caused a perfect storm for the value of copper. While the price of gold and oil doubled, copper experienced a seven fold increase.

Why? Over half the world's population lives in India, and the Pacific Rim. Many rim nations have discovered capitalism, and their own relative advantage in certain competitive markets, compounding demand for many raw materials. Demand for copper increased but its production is inelastic: slow, and costly. One country acquired *all* the production of these two huge state owned mines: China.

Another weather front in copper's perfect storm was/is war. Wars temporally increase the value of several metals as well as oil, and nitrates, while devaluing lives, culture, and civilization. The copper price storm may be fading, but it seems likely that other commodity price fluctuations will continue for the near future. So, when you buy a car or a house, invest, or even when you vote: *caveat emptor*. The living waters that surround us are rarely predictable, controllable, stable, or friendly.

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