

# Cerro De Pasco, Highest Copper Mines in the World, with Great Smelters



Outside the mining town of Cerro de Pasco - 14,200 ft. above sea level.



A Street in Cerro de Pasco

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**CERRO DE PASCO, Peru**—I have come to the top of the Andes to tell you about the greatest copper mines of this continent. They lie here on the roof of the world. They are more than 1,300 miles south of the Panama canal and something like 3,000 miles from the Strait of Magellan. They are about 200 miles east of the Pacific ocean and 3,000-odd miles from the Atlantic. Their actual altitude is over 14,000 feet, and one has to go over a pass which is 5,665 feet above sea level to reach them. I came here by the Central railway of Peru. This brought me over the Andes and down to the 12,000-foot level at the town of Oroya. There I got the Cerro de Pasco railroad and climbed up the plateau to where I now am.

Cerro de Pasco is the highest mining town of the world. It is three or four thousand feet above Leadville, and almost twice as high as Mexico City. There are peaks near it which are 20,000 feet high, and its surroundings are some of the grandest on earth. The town is right over treasures of silver and copper of incalculable value. They have been mining silver here for 300 years, and that metal is almost played out. The outlook is that they will be mining copper for 100 years more, and the copper mines are really just beginning. Today the town is like a great colander, the holes of which are the openings of mines. The Spaniards and Indians have been mining here for eight generations and now the Americans have bought the most valuable deposits and the outlook is that they will be mining for many generations to come.

**Riches in Mines.**

The story of Cerro de Pasco dates back to 1530. At that time an Indian who was watching his llama and sheep, had to stay here over night. He built a fire on the stones to keep warm and when he awoke in the morning he found the rocks speckled with globules of silver which the fire had boiled out. This story went forth and as a result something like 500,000 ounces of silver have been taken out of these mines. They are mining some silver here now and as I rode on mule back about through the town, I could see great pits large enough to swallow the Vatican at Rome or our national capitol at Washington from which that ore had been taken. The silver ore comes from a yellowish rock which lies near the surface. It disintegrates easily, and much of it is taken out in the form of a powder.

The first working was done by the Spaniards, who used Indian slaves and flogged them to keep them at labor. Later on the mines fell into the hands of Indian Cholos, and when silver was high they were owned by capitalists who paid the miners something like 40 cents a day for twelve hours' work, with an ounce of coca leaves to keep them hard on the job. Today the silver ore and many of the petty copper propositions are worked by Indians. Outside the American holdings there are many small mines; and the town of 20,000 is so peppered with holes that one would hardly dare to go about alone after dark. The native miners do their work in the old-fashioned way. They dig out the best ore with picks and carry it up ladders in rawhide sacks on their backs. I saw many piles of such ore as I rode through the city. An Indian will carry from sixty to eighty pounds at a load and they are now bringing the ore out upon ladders from a depth of 200 feet.

**Copper Ore Found.**

The ore taken out by the Indians is now largely copper, although most of it carries more or less silver. The real value of the mines is in the copper, the ore containing more and more copper as the mining goes down. The silver, which near the surface often assays 100 ounces to the ton, has gradually fallen in quality until it is now less than ten. All of the ore, however, has more or less gold and silver in it and the American company finds that the cost of the mining work is paid by the precious metals, the copper being almost pure profit. The copper is far richer than that in the mines of the United States from which our great supplies come.

It was the great copper value that

attracted the attention of American capitalists to Cerro de Pasco, and today a syndicate composed of some of our richest men have bought the mines here and they are operating them on a scale such as exists nowhere else on this continent. Among the members of the syndicate are such men as J. B. Haggin, Henry C. Frick, the Vanderbilts, the Hearst estate and others. These men have already spent tens of millions of dollars in developing the property and they have mines here that are worth, I am told, at least \$50,000,000. The business is not a stock proposition. The shares are not quoted on the exchange and so far as I know no stock has ever been offered for sale. The operation of the mines is on a plain business basis. No expense is spared to produce economic results and for some years the company sank millions without being absolutely sure of return. Today their mines are worked at a profit, and this has been the case for several years back. In 1907 they shipped over 20,000,000 pounds of copper and the smelter near here is now turning out 4,000,000 pounds of copper matte every month. This matte goes to New York, where, as I have said, the gold and silver in it about pays the expenses of mining and reduction, leaving the copper as almost clear gain.

**Americans Are Active.**

The extent of the operations of this American syndicate is almost inconceivable. They have come here to the top of the Andes, at an altitude of almost three miles above the sea, and have developed an industry which would be enormous in any part of the world. They have built a smelter about six miles from here which surpasses anything on the South American continent and which in many respects is like nothing else ever known. They have built up a town there and they practically support this city Cerro de Pasco. They have thousands of men in their employ, and there are perhaps 5,000 or 8,000 Indians or native Peruvians working in the mines and the smelter. They have within about twenty-five miles from Cerro de Pasco great mines of bituminous coal, which they have connected by railroad with this town and smelter, and they make their own coke and furnish their own fuel. They have built a standard-gauge railroad, which is by far the best in Peru, from Cerro de Pasco to Oroya, and they have more than 100 miles of track, over which cars go as smoothly as any in the states, and that notwithstanding the altitude of the road ranges from 12,000 to 14,000 above the sea. It is this road that connects them with the Central railway of Peru, by which their ore is taken down to the coast.

In its purchase of the mines the company included a great deal of land. It has here a hacienda which covers about 200,000 acres. It would take a day and a half to ride all around it. This hacienda is highly mineralized, but the title to such lands in Peru gives only surface rights, and any one can prospect and claim any mine he discovers. In addition to the mines the syndicate owns, through one of its branch companies, a great copper property at Morococha, where, I am told, the ore is even richer than that at Cerro de Pasco. The mines there are almost three miles above the sea level and they are now being worked. They are not far from the Central railway and they will have a down grade all the way to the seacoast at Callao, starting within a few miles of the mines.

**Copper Ore Rich.**

Indeed it is hard to realize the values in the copper which is being found here at the top of the Andes. The ore which is now coming out of Cerro de Pasco averages from 8 to 10 per cent of pure metal. That means that there are 200 pounds of copper in each ton. From a single ton of ore they are now getting a product equal to \$22 worth of copper, \$10 worth of silver and \$2 worth of gold. This represents the values in the rock at the mines and, of course, the expenses of getting it to the market and of smelting and reducing must be considered. Nevertheless, it is doubtful whether there is any other place in the world which has

such valuable copper deposits, and but few where the deposits are of such enormous extent. So far the Americans know that they have a great mass of ore right under this city with veins running out in a dozen directions. How big this mass is they have not discovered. They have been going down deeper and the copper is richer all the way. Said one of the superintendents to me:

"You might compare the copper formations here to your hand. Let the palm represent the great mass and your fingers the veins. As it is now we are working on one of the veins, and we have enough ore in sight to keep us busy for ten years or more without doing further development, and it is my personal opinion that we have not yet scratched the surface of what is to come. In the United States we think it a good copper mine if the ore will yield 1 or 2 per cent to the ton. Here if the ore does not assay more than 3 per cent we throw it away. Our average is about 8 per cent or more, and we have taken out some which has yielded 10 per cent to the ton."

**Below the Surface.**

During my stay here I have gone down into the mines. They already comprise about forty miles of underground workings, although where they are now mining the operations are confined to a space of about one mile by a mile and a half. The mines are worked from the 200 to the 600 foot level, and tests have been made which show that the copper goes down far below.

Entering the shaft, we dropped to the 400-foot level and then took the electric trolley which carries the ore through the narrow tunnels to the shaft. The tunnels are so small that we could barely stand upright within them and from the center of the track one could easily reach the sides of the walls. Some of the tunnels are timbered with Peruvian eucalyptus or with Oregon pine, but everywhere the work is so scientifically done that the rock in most cases upholds the walls. Here and there we stopped in a chamber

where the miners were taking out ore. The machinery is of the very latest invention and the drilling is done with compressed air. The workmen are Cholos or native Peruvians, who are paid from 50 cents and upward a day. They make excellent miners and some of them do quite as well as men of the same class in the states. They work in eight-hour shifts with two shifts a day. The shifts are so arranged that the second stops at 3 o'clock in the morning, so that all of the men can sleep a part of the night.

Everything is managed after the most approved mines of the states and this same plan is preserved in all the operations of the work. About 120 samples of ore are assayed every day and the miners know exactly what they are doing. They have a curious way of determining without a scientific assay, as to whether the ore is valuable or not. This is by means of a tallow candle. They light the candle and by dusting it with the ore the copper in it gives forth a green flame, the color of which shows just about the percentage of metal the ore contains. As I went through the mine with Mr. Glidden, the assistant manager, he made such a test and told me that the car of ore averaged probably about 12 per cent.

**Loading by Gravity.**

During our journey we went from chamber to chamber, now walking through the tunnels and now jumping aside to let the cars pass. The whole lot of the underground workings are a beehive of industry and the work of getting out the copper goes steadily on without friction. The mines are so arranged that the cars are loaded by gravity, and the mining is most economically done.

In going through the tunnels we used acetylene, the carbide of which comes from the United States, and every miner we met had an acetylene lamp on his cap. The managers find that this is much cheaper than candles. The mines are worked by electricity which is now generated by steam, but the company is installing a great electric plant at Oroya, about seventy-five miles away, where they own a stream with a fall which will generate about 15,000 horsepower. Within

a short time all of their works here and at the great smelter and also at the associate mines of Morococha will be operated by the fall of this river. At present the steam is produced by coal from the company's coal mines, which are about twenty-five miles from Cerro de Pasco. They use this to make coke for the smelter, and they have great quarries of almost pure limestone, half way between the mines and the smelter, which is only six miles distant and 200 feet lower down.

**The Smelters.**

During my stay, I have spent some time at the smelter. The place is known by the Peruvian name of La Fundicion. The works are situated on the side of the mountain, so that the ore starts in at the top and goes by gravity through the various processes until it comes out in copper matte as big around as a bread bowl, ready to be sent down on the cars. The smelter is the largest in South America. It must cover several hundred acres. It consists of great buildings, colored black with the smoke. They are walled with glass windows and have roofs of galvanized iron. Rising above them are three mighty smokestacks each so big around that you could run a Pullman car through it without touching the walls. These stacks are about 300 feet high and from them day and night pour out vast volumes of white and yellow smoke into the clouds of the Andes. The smelter has the finest of modern machinery and every pound of it came from the states. This is so also of the great iron buildings and of the wood used for the structures and railroad. The establishment has duplicates of everything needed for smelting. It runs three eight-hour shifts and keeps busy Sunday and week-days all day and night. I am told that it is the largest copper smelter outside of the United States and that it is patterned after the mighty works at Great Falls, Mont.

**Furnace Problems.**

In building this smelter the engineers had to contend with difficulties unknown before. No one had ever constructed a smelter at 14,000 feet above the sea and the experts said that furnaces could not

be run at that altitude. They claimed that the air was so rare that you would have to blow through the fire several times as much air per minute as is usually done in order to secure the oxygen sufficient for the reaction. Nevertheless, the syndicate determined to try it. They got the best men they could find and put up the buildings. But the furnaces would not work and one engineer after another came here and left, throwing up his hands in despair. At last there was a man from Mexico who had passed through Missouri and had to be shown. He said he did not believe that the figures told the real story. He was an old smelter man and he said the furnaces did not sound right. He began by taking off all the gauges and putting the blasts in such a way that he got the right sound. He then started to working and lo! the plant did its work.

Up to that time it looked as though these mines, which had already cost tens of millions, would fail. The capitalists poured in money like water, and they had poured in so much that they could not let go. Since that discovery their fight has been successful and it is now a proposition which pays exceedingly well. As soon as they discovered the secret of the smelting they got an expert engineer, named Frank Klepcho, who had been connected with the Guggenheims, and who had built, I think, the smelter at Great Falls, Mont. It was he who planned the great buildings here and made them successful. He introduced new inventions and put in treatments that are especially fitted for these mines and works high up on the roof of the world. One of the curious things used is called the clindinger machine. This takes the fine ore and turns it into a coke so that it can be easily smelted.

**An American Industry.**

But I wish I could take you through this great working monument of American industry that has been created away out here on the top of the Andes. I should like to show you our men directing the work and bossing the mines. I would show you the ore as it flies over an American railroad and we could watch it as it rolls from the cars to the fur-

We might even open the furnace doors and see the crimson copper blazing within. We would feel flames that are seven times hotter than those through which Methach, Shadrach and Abednego walked and later on in the converters we could watch the liquid gold emptied by a seventy-ton crane, worked from above. We could see the golden sublimar flying off into the air, and the iron slag running away while the pure copper, silver and gold flowed into the molds. We could see the metal change in color as it cooled and watch the round blocks of 300 pounds as they were loaded on to the cars to be shipped to the states.

I spent the better part of a day in the smelter, and it made me feel proud that I was an American born. The output of the works, as I have said, is now more than 4,000,000 pounds of matter every month, and that means 4,000,000 pounds of copper, silver and gold. It is equal to more than 5,000 pounds every hour of the day and the night, Sunday and week days, all the year through.

FRANK G. CARPENTER.

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