

# **Mining at Bisbee**

## **A Historical Overview**

**1877 - 1900**

# MINING AT BISBEE

## A HISTORICAL OVERVIEW

1877 - 1900

**CUTTING HITCHES TO PLACE DRIFT TIMBER  
CZAR MINE C - 1900**



GRAEME LARKIN COLLECTION

During the late 1870s, the southeastern part of the Arizona Territory was a hostile and dangerous place. A lack of water and an abundance of warlike Apaches, American outlaws and Mexican bandits kept all but the foolish and desperate away. Few dared enter this barren and desolate area alone. It was during a search for Geronimo and other renegade Apaches that a small detachment of the US Cavalry came into the solitary Mule Pass Mountains in the summer of 1877 and which led to the accidental discovery of what became one of the World's great mines.

Early that year, the silver deposits in what would become Tombstone had been discovered some 23 miles north and west of the Mule Pass Mountains, so the soldiers and their civilian scout guides were doubtlessly on the lookout for signs of mineralization wherever they went. The rust-red hills they found in the Mule Mountains under the relentless August sun must have stirred their imagination, but at the moment water was more important. Indeed it was during the search for water that civilian army scout Jack Dunn found chunks of red-brown, minium-coated cerussite at the base of a hematite pinnacle. Together with Lieutenant J. A. Rucker, his commanding

officer, and T. D. Bryne, Dunn located the first mining claim in Mule Gulch on August 2, 1877, naming it the Rucker Mine, even though it was just a mining claim.

("Rucker Mine")

Notice of Location Notice is hereby given that  
in pursuance of an act of Congress dated  
May 10 1872. We the undersigned have this  
day located and claimed (500) hundred linear  
feet on this vein or lode of mineral bearing ore  
and <sup>three</sup> 300 hundred feet in width on each side  
thereof located in Mule Pass Pite No Known Mining  
District in the County of Pima Territory of  
Arizona and more particularly described as  
follows to wit. Commencing at a monument  
of stone on the ledge on the southwest end of  
claim which bears North East from this  
monument of stone and running North East  
along the lode to a similar monument  
This claim shall be known as the Rucker Mine

J. A. Rucker  
John Dunn  
T. D. Bryne

Dated August 2<sup>d</sup> 1877  
Filed and recorded at request of T. D. Bryne  
August 29<sup>th</sup> A.D. 1877 at 30 min past 1 P.M.

Sidney H. Carpenter.  
County Recorder

A hand-scribed, true copy the original location notice as filed with the Pima County Recorder on August 29, 1877.

It would be three long and difficult years before any real mining was to take place. The early years in Mule Gulch, as Bisbee was then known, were uncertain ones. It was silver, often found mixed with lead that was the metal sought, not copper, but there was no silver to be found. The cerussite outcrop found by Dunn was very small and soon gone as all early attempts to mine and smelt the lead had ended in failure. Meanwhile, a number of other mining claims had been filed nearby by other prospectors, mostly on the several small and discontinuous copper outcrops. They quickly sold their undeveloped mining claims whenever they could, thus the claims changed hands several times before those with the necessary experience, capital and foresight were in place to exploit the potential (if any) that this remote and desolate site offered.

The first hint of greatness came in August of 1880 with the chance discovery of extraordinarily rich copper ores on the surface of the Copper Queen mining claim, where brush was being removed (Douglas, 1881). Mining began in earnest soon after and a small, but adequate smelter constructed by the newly formed Copper Queen Mining Company.

However, before the copper could be mined economically, transportation difficulties had to be overcome and a solid market for the metal established. Serendipitously, these two enormous challenges were overcome by forces external to and independent of what was happening at Bisbee. These events had as much to do with Bisbee's eventual success as did the rich ores and capable management of the mines as they developed.

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#### **THE DEVELOPMENT OF BISBEE – THE COMING OF THE RAILROAD**

**BISBEE DID NOT BECOME AN IMPORTANT MINING CENTER IN ISOLATION. TWO SIGNIFICANT, NATIONAL DEVELOPMENTS MADE IT POSSIBLE – CHEAP, EFFICIENT TRANSPORTATION FOR BULK COMMODITIES COUPLED WITH NEW USES AND INCREASED DEMAND FOR COPPER**

**CHEAP AND EFFICIENT TRANSPORTATION COMES TO THE WEST.**

- THE DEVELOPMENT OF THE GREAT WESTERN COPPER DEPOSITS AT BUTTE, MONTANA, AS WELL AS GLOBE, CLIFTON AND BISBEE IN ARIZONA WAS ONLY POSSIBLE BECAUSE OF INEXPENSIVE TRANSPORTATION PROVIDED BY THE NEW, TRANSCONTINENTAL RAILROADS**
- ALL BASE METAL MINES ARE EXTREMELY SENSITIVE TO TRANSPORTATION COSTS. NOT ONLY DID THE MANY TONS OF METAL NEED TO BE SENT TO MARKET, BUT MANY MORE TONS OF CONSUMABLES –COAL, COKE, TIMBER, MACHINERY AND THE NECESSITIES OF LIFE – HAD TO BE BROUGHT IN**
- THE COMPLETION OF THE SOUTHERN, TRANSCONTINENTAL RAILWAY IN 1881 WAS VITAL FOR BISBEE'S SUCCESS . YET, BISBEE WAS STILL 65 MILES FROM THE NEAREST RAILROAD, BUT THIS WAS EVER SO MUCH CLOSER.**

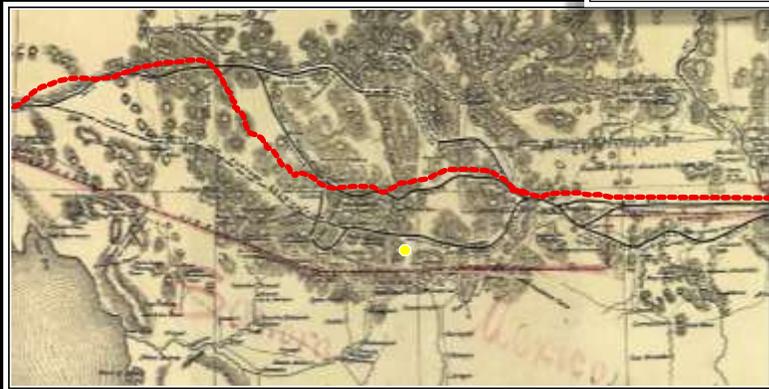
**BEFORE THE COMPLETION IN 1881, BISBEE'S CRUDELY SMELTED COPPER WAS SENT TO SAN FRANCISCO BY WAGON AND RAIL, THEN BY SHIP TO NEW YORK. THE ORE MINED HAD TO BE VERY HIGH GRADE TO PAY THE COST OF GETTING IT TO MARKET AND STILL MAKE A PROFIT. THERE WAS LITTLE ORE OF SUCH A HIGH GRADE THAT IT COULD SUPPORT THESE COSTS.**

**THE FULL DEVELOPMENT OF ARIZONA'S GREAT MINERAL WEALTH  
DEPENDDED ON CHEAP AND EFFICIENT TRANSPORTATION**

**BASE METAL MINING IN ARIZONA LAGGED AS THE SOUTHERN RAILWAY CROSSING THE TERRITORY DID NOT REACH TUCSON UNTIL MARCH 1880**



**A 22-MULE TEAM HAULING WAGONS OF COKE TO THE COPPER QUEEN 1884**  
GRAEME LARKIN COLLECTION



**POSSIBLE RAILROAD ROUTES THROUGH THE ARIZONA TERRITORY - 1857**

Library of Congress

**• IT WAS NOT COMPLETED UNTIL 1881 WHEN IT JOINED THE SANTA FE AT DEMING, NEW MEXICO.**

**. BISBEE'S FUTURE DEPENDED ON THIS VITAL LINK.**

Base metals are transportation intensive industries. It required inexpensive transportation to make a copper mine a truly profitable venture. Thus, until the southern leg of the transcontinental railroad crossed the Arizona Territory in 1880-1881, no base metal mines in Arizona were truly successful.

For the mines at Bisbee, the rail spur from Benson to Fairbank and the connection to the New Mexico and Arizona Railroad or the Southern Pacific was a God-send. Rail transportation was but 40



A part of an 1887 map showing the roads to Bisbee and the location of The railroads to the north. The best road connection was to the rail junction at Fairbank. Library of Congress

miles distant, a hard 40 miles to be sure, but within what was a reasonable distance for the time. In 1882, the Copper Queen sought to shorten the haul distance by nearly 20 miles by constructing a road over the Divide of the Mule Mountains.

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## **THE DEVELOPMENT OF BISBEE – THE AGE OF ELECTRICITY**

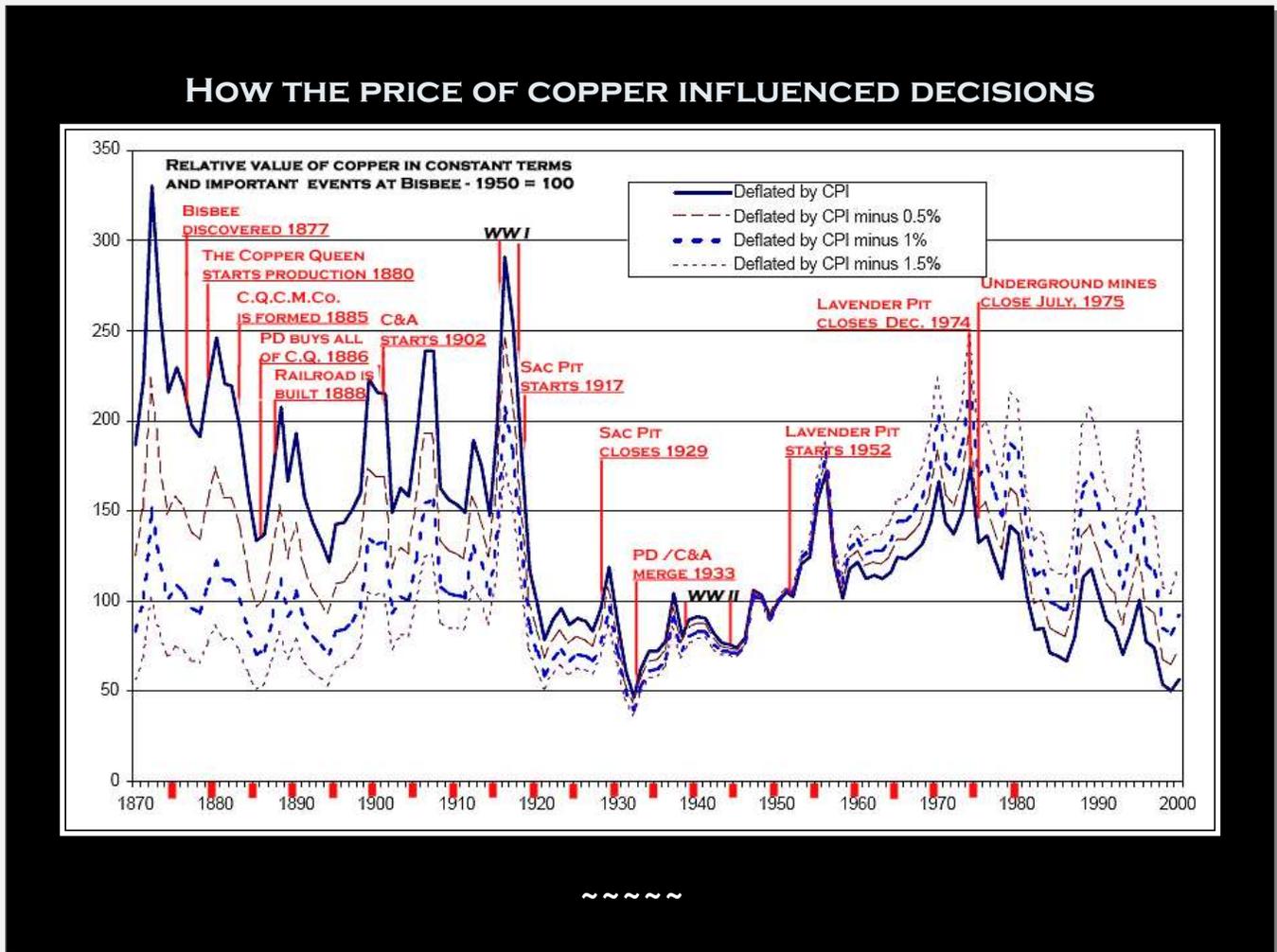
- **THE INCREASING DEMAND FOR COPPER GENERATED A PRICE SUFFICIENTLY HIGH TO MAKE REMOTE DEPOSITS LIKE BISBEE ECONOMICALLY VIABLE**
  - **HISTORICALLY, THE USES FOR COPPER WERE FEW – COOKING POTS, WOODEN SHIP CLADDING, ROOFING, MINOR COINAGE AND ORNAMENTAL BRASS . BY THE LATE 1860s, IRON HAD LARGELY REPLACED THE FIRST TWO USES, THUS REDUCING DEMAND**
  - **THIS LIMITED DEMAND WAS EASILY FILLED BY THE GREAT MINES IN NORTHERN MICHIGAN AS WELL AS IMPORTS FROM THE SOON TO BE GREAT MINES IN CHILE, BOTH OF WHICH WERE CLOSE TO CHEAP, WATER TRANSPORTATION**
- **THEN CAME THE ELECTRIFICATION OF AMERICA – ELECTRICAL POWER FOR INDUSTRY, REPLACING STEAM AND LIGHTING FOR BOTH HOME AND INDUSTRY, REPLACING GAS. TELEPHONE AND TELEGRAPH BOTH HELPED TOO, THOUGH IN A RELATIVELY MINOR WAY.**

With the wide-spread use of electricity, copper's future was secure. No other element had the ability to efficiently and cheaply transmit electricity. Even today, copper is the best material for this application.

The increased demand did not result in a huge price increase in copper, but rather stimulated the development of more mines, so increased copper availability somewhat stabilized the price as did the introduction of electrolytic refining, which substantially improved copper quality. Thus sufficient amounts of reasonably priced good quality copper were available to meet the ever growing demands for the red metal. Had copper remained relatively high in cost and/or poor in quality, the electrification of America would have been retarded and the development of the

country less dynamic at a critical moment in history. Copper is still critical to growth and development today.

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The above graph shows that fortuitously, the Copper Queen began production at a relative high in the price of copper. A declining copper market undoubtedly was a factor in the Copper Queen deciding to merge with the Atlanta to form the Copper Queen Consolidated Mining Company.

As they had faith in the long-term outlook for copper, PD bought out the last holdings of the original Copper Queen in low price times, further; they invested in new smelting works and built the railroad to reduce cost during an upturn in copper prices. The C&A was founded by outside capital during a time of good copper prices. These types of events still encourage people to look for deposits and capital is relatively easy to raise in the market.

World War I causes a huge jump in copper prices which encouraged PD to design and start the Sacramento Pit project, but they missed the peak. However, they were able to produce copper more cheaply from the Sac Pit during low prices.

The Great Depression brought the two companies together by 1933, just to survive the worst copper prices ever seen. World War II boosted the price, but government imposed war time price controls prevented it from experiencing the huge price jump seen during WWI. However, as a part of the War effort, government subsidized production, thus the actual profit would have been more than is apparent from the graph. The post WWII years were difficult for the copper industry, but as prices recovered, PD designed and built the Lavender Pit mine with the assurance of government price support, which was never needed because of the rise in prices.

A period of relatively modest to low prices made the late 1950s and 1960s difficult years during which there were two extended labor strikes (1958 - 6 months, 1967/68 - 8 months). The pit was too mature to withstand the declining prices of the mid 1970s as the long hauls made the last ores expensive and the huge waste removal required to increase reserves was totally uneconomic, thus the pit was closed. The decline in copper price continued and six months later the underground mines closed because the costs were just too high and better prices were not in sight. Indeed, copper prices did not improve substantially for more than 30 years after the final closure of the mines at Bisbee.

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### **A VERY DIFFICULT BEGINNING**

- **THE NEW FIND IN MULE GULCH ATTRACTED CONSIDERABLE ATTENTION RIGHT AWAY. THE COCHISE COUNTY RECORD OF MINES SHOWS:**
  - **IN 1877 A TOTAL OF 16 CLAIMS WERE LOCATED**
  - **DURING 1878, 47 MORE WERE RECORDED, INCLUDING THE COPPER QUEEN**
  - **1879 SAW 53 ADDITIONAL CLAIMS FILED**
  
- **THE FIRST MINING EFFORTS IN MULE GULCH WERE AN ABSOLUTE FAILURE**
  - **THE LEAD ORES ORIGINALLY FOUND DID NOT CONTAIN APPRECIABLE SILVER AND WERE VERY LIMITED IN SIZE. THIS WAS NOT ANOTHER “TOMBSTONE-LIKE” DEPOSIT.**
  - **COPPER SHOWINGS WERE FOUND NEARBY, BUT IT WAS HUNDREDS OF MILES TO THE CLOSEST RAILROAD, THUS THEY WERE OF LITTLE VALUE.**
  - **GEORGE WARREN AND SEVERAL ASSOCIATES MINED A SMALL COPPER SHOWING AND BUILT A TINY SMELTER, BUT THE VENTURE FAILED FINANCIALLY**
  - **IN ANY EVENT, THE CLAIM OWNERS DID NOT HAVE THE NECESSARY CAPITAL TO DEVELOP A COPPER MINE, AS THE OLD SAYING WENT “TO OPEN A COPPER MINE, YOU HAVE TO OWN A GOLD MINE TO FINANCE IT.” THIS WAS EVER SO TRUE IN THE REMOTE MOUNTAINS OF SOUTHEASTERN ARIZONA IN 1878. THE COPPER QUEEN MUST BE SOLD**

### THE COPPER QUEEN IS SOLD BY THE DISCOVERER'S

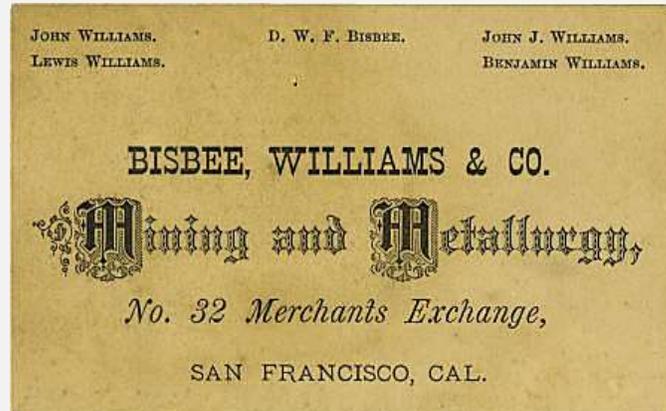
- **IN APRIL 1880, ONE ED REILLY PAYS \$800 FOR AN OPTION TO BUY THE COPPER QUEEN MINING CLAIM, BUT DOES NOT HAVE THE NEEDED \$15,000 TO COMPLETE THE PURCHASE**
  - HE GOES TO SAN FRANCISCO TO THE MINING CONSULTING FIRM OF WILLIAMS & BISBEE WHO CONNECT HIM WITH BALLARD & MARTIN WHO WILL FINANCE THE PURCHASE FOR 2/3 OF THE PROPERTY FOR \$20,000.
  - THE COPPER QUEEN OREBODY IS SERENDIPITOUSLY DISCOVERED WEST OF THE SMALL, EARLY WORKINGS
  - BEN WILLIAMS BECOMES MINE SUPERINTENDENT AND MINING BEGINS IN EARNEST
  - LOUIS WILLIAMS IS PLACED IN CHARGE OF THE SMELTER WHICH WAS COMPLETED IN AUGUST OF 1880
- **THE COPPER QUEEN BEGINS HER ASCENDANCY TO FAME AS THE RICHNESS AND SIZE OF HER OREBODY IS DEMONSTRATED.**

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In early December 1879 Edward Reilly went to Mule Gulch to look at the Copper Queen claim on the recommendation of Tucson merchant, Luis Zeckendorf. The early workings were then four feet wide and ten feet deep and about ½ a ton of malachite containing ore averaging 22% set outside the cut. This ½ ton has been sorted out of 7 ½ tons of rock mined, but the mine looked impressive.

The owners at the time were Marcus Herring, George Eddlemen, G. W. Anshurtz and George Klein with 2/3 interest and D. B. Rea, George Atkins and W. F. Bradley with a combined 1/3 ownership. The 2/3 ownership was sold for \$9,000 and the 1/3 for \$6,000 in April 1880 to Reilly.

As Reilly has no real money he must sell a majority of the claim to keep a share, which he does, via the firm of Bisbee, Williams & CO., to Martin and Ballard who buy 2/3 for \$20,000 in May of 1880. They also commit to furnish the necessary working capital and finance the building of a smelter.



BUSINESS CARD FOR THE FIRM OF BISBEE,  
WILLIAMS & Co. - 1881

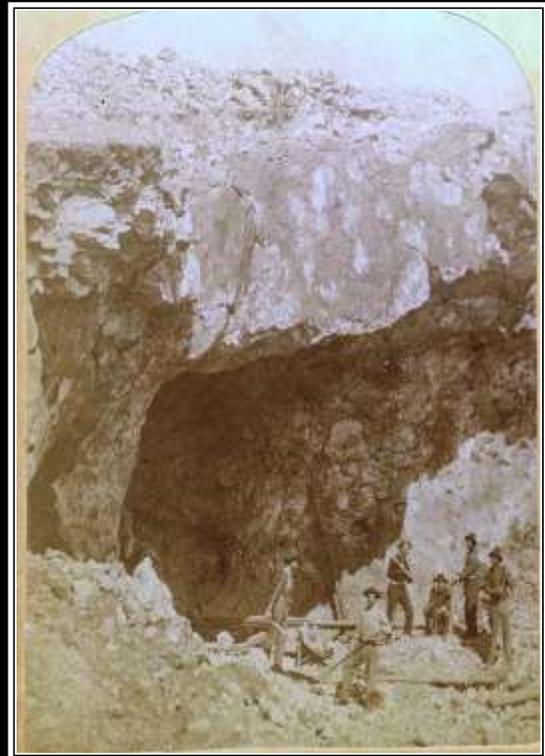
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### THE EARLY YEARS MINING THE COPPER QUEEN

EARLY MINING WAS STRAIGHT FORWARD. THE RICH MALACHITE ORE WAS BROKEN AND LOADED INTO WHEELBARROWS WHICH WERE PUSHED A SHORT DISTANCE AND DUMPED INTO A CHUTE LEADING TO THE SMELTER BELOW.

THE ORE SMELTED EASILY AND PRODUCED A CLEAN, VERY MARKETABLE BAR "BLACK COPPER". FOR EVERY 100 TONS OF ORE SMELTED, 22 TONS OF COPPER WERE PRODUCED, HOWEVER THE GRADE SOON DROPPED TO 16%.

SUBSTANTIAL PROFITS WERE BEING MADE FROM THIS SIMPLE OPERATION. THE CAPACITY OF BOTH THE MINE AND SMELTER WERE SOON EXPANDED WITH A SECOND FURNACE ADDED IN AUGUST 1881. ~~~~~



GRAEME LARKIN COLLECTION  
MINING IN THE COPPER QUEEN OPEN CUT  
1881

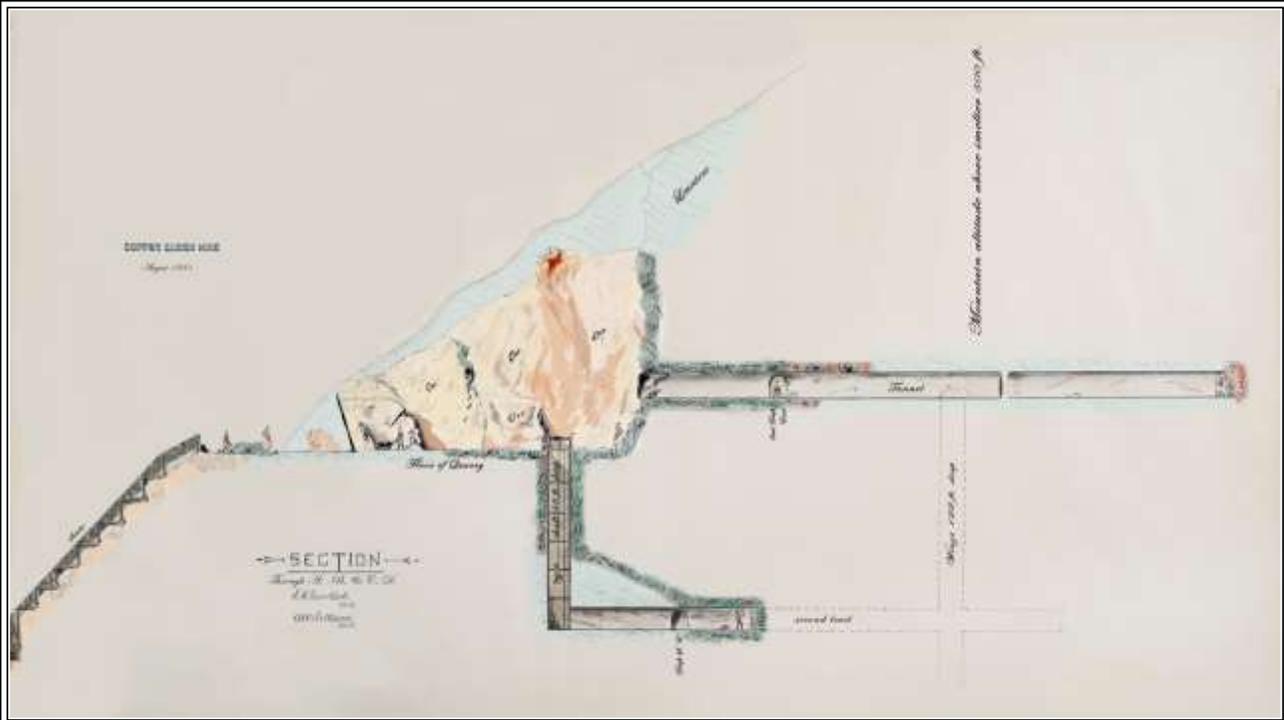
Black copper was the term used to describe copper which was smelted in furnaces like those at early Bisbee where the ore was shoveled in to the furnace with coke in a ratio of 8 parts ore to one part coke. The bars typically were +95% copper and free of any deleterious impurities.

Thus, quite marketable in the era before electrolytic refining became commonplace. Only the copper from northern Michigan “Lake Copper” as it was called, was of a superior quality.

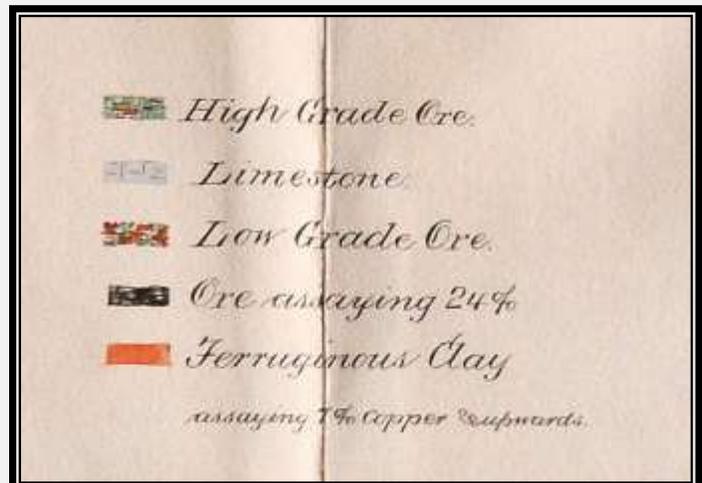
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## THE COPPER QUEEN MINE

### A CROSS SECTIONAL VIEW OF THE COPPER QUEEN MINE IN 1881

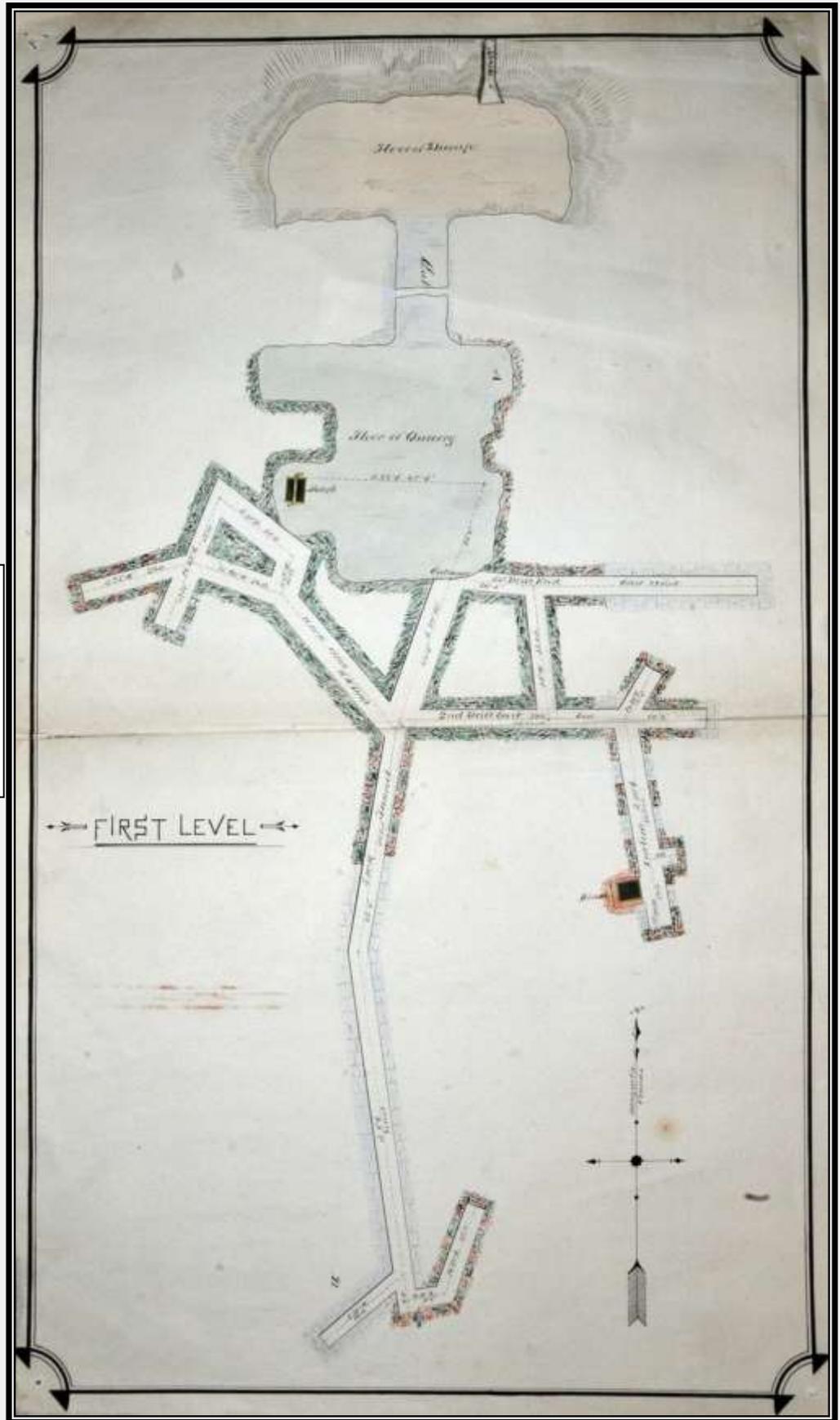


As shown by the legend at the right, in the illustrations above and below, the high-grade, malachite-containing ore is depicted in green with a bit of red and black, much as it appeared in the mine. The lower grade material is shown as malachite mixed with the red-brown iron oxides, again much as it was seen in the mine.



Assay legend from an 1881 Copper Queen Mine map.

MAP OF THE  
FIRST LEVEL OF  
THE COPPER  
QUEEN MINE  
SHOWING THE  
OPEN CUT OR  
QUARRY, AS IT IS  
SO NOTED - 1881



## NEW OWNERS, LITTLE FAITH

**IN SPITE OF THE APPARENT RICHNESS AND THE STEADY FLOW OF PROFITS, THE NEW OWNERS HAD BUT ONE DESIRE AND THAT WAS TO SELL BEFORE THE ORES WERE EXHAUSTED.**

**EARLY WORK ON THE COPPER QUEEN OREBODY WAS MOST PROMISING.**

**THE COPPER CONTENT WAS HIGH AND THE VOLUME OF ORE SEEMED IMPRESSIVE.**

**BOTH MINING AND SMELTING WERE REASONABLY SIMPLE**

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**MINING IN THE COPPER QUEEN OPEN CUT 1883**

In this classic cabinet photo, the support timbering has been placed in a manner called cribbing. It is one of the strongest forms of ground support. Also visible are Nobel brand dynamite boxes and two staged double jack drilling teams, with the one at the bottom drilling a down hole and immediately above, the second team is drilling an up hole.

## THE SEARCH FOR ADDITIONAL WAS FRUSTRATING

**IN THEIR EFFORTS TO LOCATE MORE ORE, THE OWNERS OF THE COPPER QUEEN SANK AN INCLINED SHAFT IN 1881 AND WHILE IT MADE MINING OF THE ORIGINAL OREBODY MORE EFFICIENT, NO NEW ORE WAS FOUND DESPITE MUCH DRIFTING.**



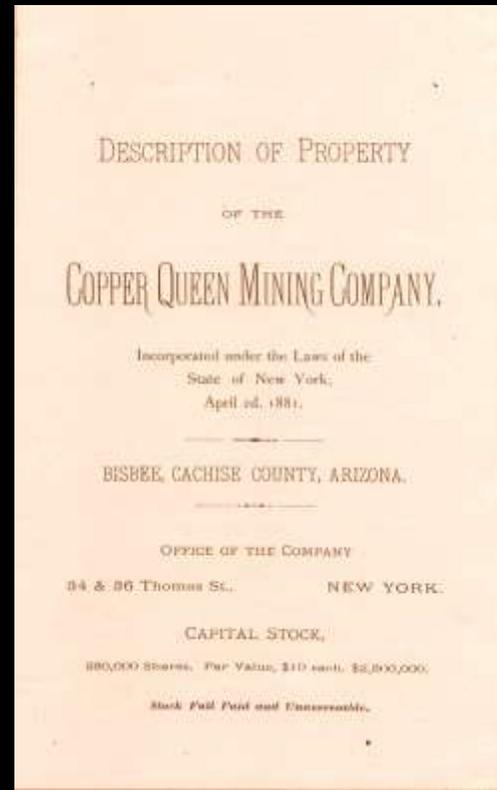
**WORKINGS OF THE COPPER QUEEN MINE 1882**

**FROM AN ORIGINAL MAP IN THE GRAEME LARKIN COLLECTION**

As illustrated by the map above, the Copper Queen had searched for additional ore on the four levels of the Queen Inclined shaft. The first level is shown in black, the second in red, the third in yellow and the fourth in black. In time, it was to be a continuation of exploration work on the fourth level which would be successful, but much drama was to transpire first.

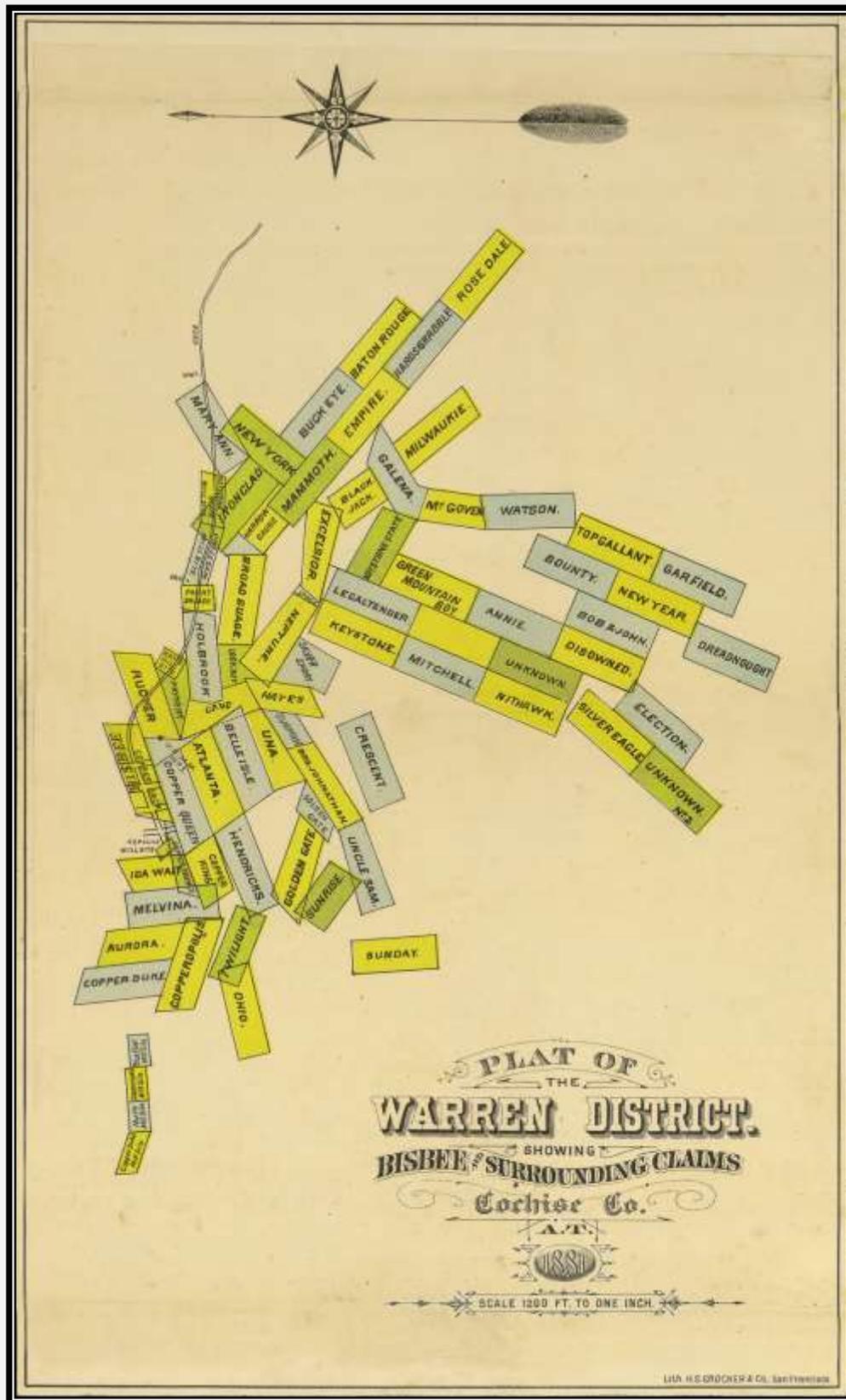
## THE COPPER QUEEN MINE WAS ALWAYS FOR SALE

- **HOWEVER, THE NEW OWNERS HAD VERY LITTLE FAITH IN THE DEPOSIT.**
  - **THIS WAS A LIMESTONE HOSTED REPLACEMENT COPPER DEPOSIT AND THE NATURE OF THESE DEPOSITS WAS POORLY UNDERSTOOD. FEW PEOPLE BELIEVED THEY COULD BE VERY LARGE**
  - **THERE WAS A FEAR THAT IT, TOO WOULD BE LIMITED IN SIZE AND BE SOON MINED OUT AND NO NEW OREBODIES FOUND. AFTER ALL, THE WEST WAS DOTTED WITH GHOST TOWNS THAT HAD GROWN UP QUICKLY AROUND RICH DEPOSITS WHICH, IN THE END, WERE VERY SMALL. WAS BISBEE TO BE ANOTHER ONE OF THESE?**



PROSPECTUS OF THE COPPER QUEEN MINE  
1881

The mining press of the day periodically carried a notice that the Copper Queen had been sold, but in fact it never did. This was a huge concern to Messieurs Martin and Ballard who were very anxious to sell the mine while there was still ore in sight --- and the ore was disappearing quickly. This is why they were looking for more – not to make the mine better, but to make it more saleable.

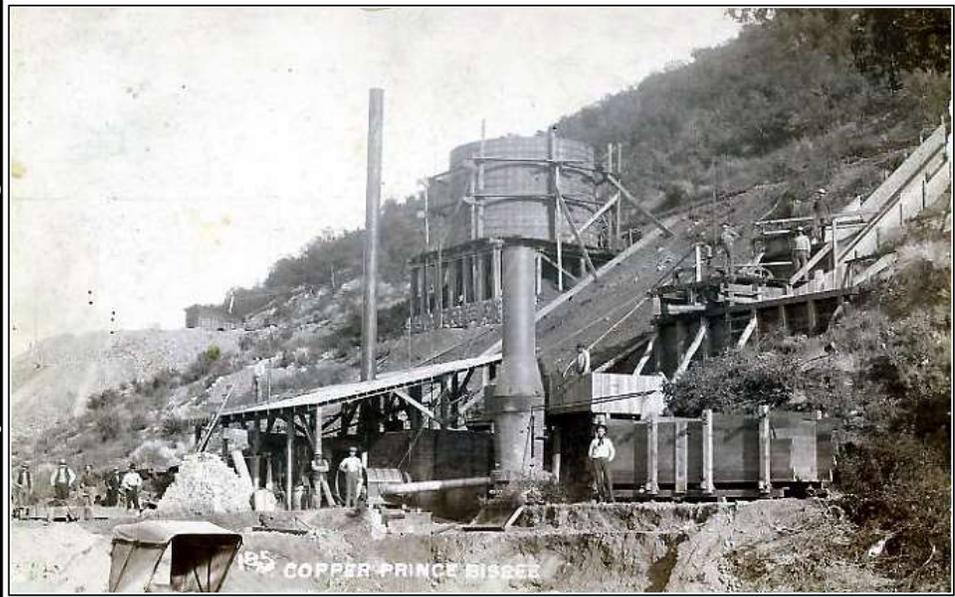


1881 map of the registered mining claims in the Warren Mining District. Library of Congress

**THERE WERE OTHERS HERE TOO — ARIZONA PRINCE COPPER CO.**

**THE ARIZONA PRINCE COPPER COMPANY WAS AMONG THE FIRST TO COME. IT OWNED THE ADJACENT COPPER PRINCE CLAIM AND WAS INITIALLY SUCCESSFUL AND BUILT A SMELTER. THE ORES WERE LIMITED WITH LITTLE HOPE OF FINDING MORE. HOWEVER, THEY DIPPED INTO THE COPPER QUEEN CLAIM WHICH GAVE THE PRINCE THE RIGHT TO MINE THEM.**

**A BATTLE BETWEEN THE COPPER QUEEN AND THE PRINCE WAS INEVITABLE AND NOT LONG IN COMING. IT STARTED IN 1881 WHEN THE PRINCE BROUGHT SUIT AGAINST THE QUEEN FOR TRESPASSING UNDER THE HATED “LAW OF THE APEX” AND WON, ONLY TO BE PURCHASED BY THE CQCMCO IN 1887.**



**COPPER PRINCE SMELTER C-1882**

**GRAEME LARKIN COLLECTION**

Actually, the Copper Queen was mining ore it found on its own claim, the Copper Queen, but it was a physical extension of the ore mined by the Arizona Prince on its own claim and they followed it onto the Copper Queen claim, as was the common. When they found the Copper Queen mining “their ores” the Prince filed a claim of trespass against the Queen. Under the extralateral rights of a mining claim the owner of the highest part of the ore or formation could follow it outside the physical boundaries of his claim. The though being, that the highest point of the ore would be the natural point of discovery and the discoverer or his successor in interest should have the right to fallow the ore to its end, a perfectly logical position, but one which in nature was much less clear. Nonetheless, this “right” had recently been confirmed by the much hated Richmond Eureka case decided in Nevada. The law as written says:

*“The locators of all mining locations heretofore made, or which shall hereafter be made, on any mineral vein, lode or ledge, situated on the public domain, their heirs and assigns, where no adverse claim exists on the tenth day of May, eighteen hundred and seventy-two, so long as they comply with the laws of the United States, and with state territorial and local regulations not in conflict with the laws of the United States governing their possessory title, shall have the exclusive right of possession and enjoyment of all the surface included within the lines of their*

*locations, and of all veins, lodes and ledges throughout their entire depth, the top or apex of which lies inside of such surface lines extended downward vertically, although such veins, lodes or ledges may so far depart from a perpendicular in their course downward as to extend outside the vertical side lines of such surface locations. But their right of possession to such outside parts of such veins or ledges shall be confined to such portions thereof as lie between vertical planes drawn downward, as above described, through the end lines of their locations, so continued in their own direction that such planes will intersect such exterior parts of such veins or ledges. And nothing in this section shall authorize the locator or possessor of a vein or lode which extends in its downward course beyond the vertical lines of his claim to enter upon the surface of a claim owned or possessed by another.' Act May 10, 1872”*

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### **THERE WERE OTHERS HERE TOO – NEPTUNE MINING CO.**

**THE NEPTUNE MINING COMPANY WAS HERE TOO. THE CLAIMS THEY HELD ULTIMATELY PROVED TO BE EXTRAORDINARY RICH, BUT MOST OF THEIR MONEY WAS SPENT BUILDING A SMELTER ON THE SAN PEDRO RIVER NEAR PRESENT DAY HERFORD WHICH PRODUCED SOME COPPER IN 1881. ULTIMATELY THE CQCMCO ENDED UP WITH THESE FINE PROPERTIES WHICH INCLUDED THE DIVIDEND AND SILVER SPRAY. ~~~~~**

**A “PRETENTIOUS” HOUSE (FOR BISBEE OF THE ERA) CALLED “THE CASTLE” WAS BUILT AT THE BASE OF SAC HILL FOR ITS MANAGER “COLONEL” HERRING AND WAS SEEN AS IMPRUDENT AND A WASTE OF MONEY BY THE COMPANY.**

**“THE CASTLE” C – 1884  
GRAEME LARKIN COLLECTION**



The Neptune Mining Company held, what proved with more investigative work, substantial ore deposits. However due to a combination of underfinancing and poor management caused the company to become insolvent. Interest favorable to the Copper Queen Consolidated Mining Company purchased the claims at a sheriff’s sale in 1890 (E & MJ, 1890). At first the properties were developed independently as the Holbrook and Cave Mining Company, but under

the same management as the Copper Queen. The ores were smelted in the Copper Queen smelter and the black copper bars marked as H & C, while the Copper Queen bars were marked as C ★ Q.



A Holbrook and Cave check signed by Ben Williams as Superintendent. He was also the Superintendent of the C. Q. C. M. Co. at the same time. Graeme Larkin collection

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**THERE WERE OTHERS HERE TOO – ATLANTA MINING Co.**

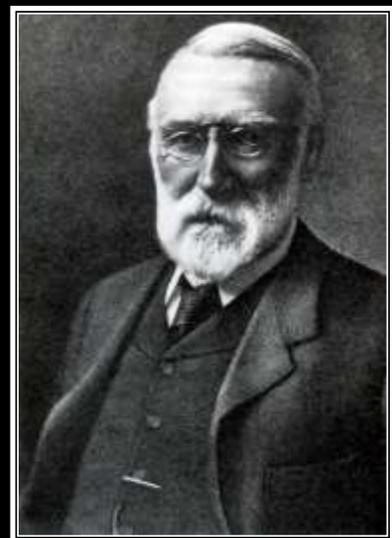
- **PHELPS DODGE HAD LONG CONSIDERED BECOMING A COPPER PRODUCER AND HAD LOOKED AT BISBEE SEVERAL TIMES BEFORE BUYING THE ATLANTA CLAIM IN 1881 ON THE RECOMMENDATION OF JAMES DOUGLAS**

**PD WOULD ASK DR. DOUGLAS TO GO TO BISBEE AND PERSONALLY OVERSEE THE MINE HE HAD RECOMMENDED THEY BUY**

**DOUGLAS WAS NO STRANGER TO BISBEE AS HE HAD VISITED HERE SEVERAL TIMES, EVEN TO HELP SELL THE COPPER QUEEN FOR MARTIN & BALLARD**

**THIS TIME HE WOULD STAY AND EXPERIENCE HUGE FRUSTRATIONS LOOKING EVERYWHERE FOR ORE, FRUSTRATIONS SHARED EQUALED ONLY BY HIS NEIGHBORS AT THE COPPER QUEEN AS THEY TOO SEARCHED FOR MORE ORE, BUT IN VAIN**

**SURELY THE GREAT COPPER QUEEN OREBODY WAS NOT THE ONLY ONE HERE, OTHERS MUST BE HIDDEN IN THESE LIMESTONES, BUT WHERE ~~~~~**



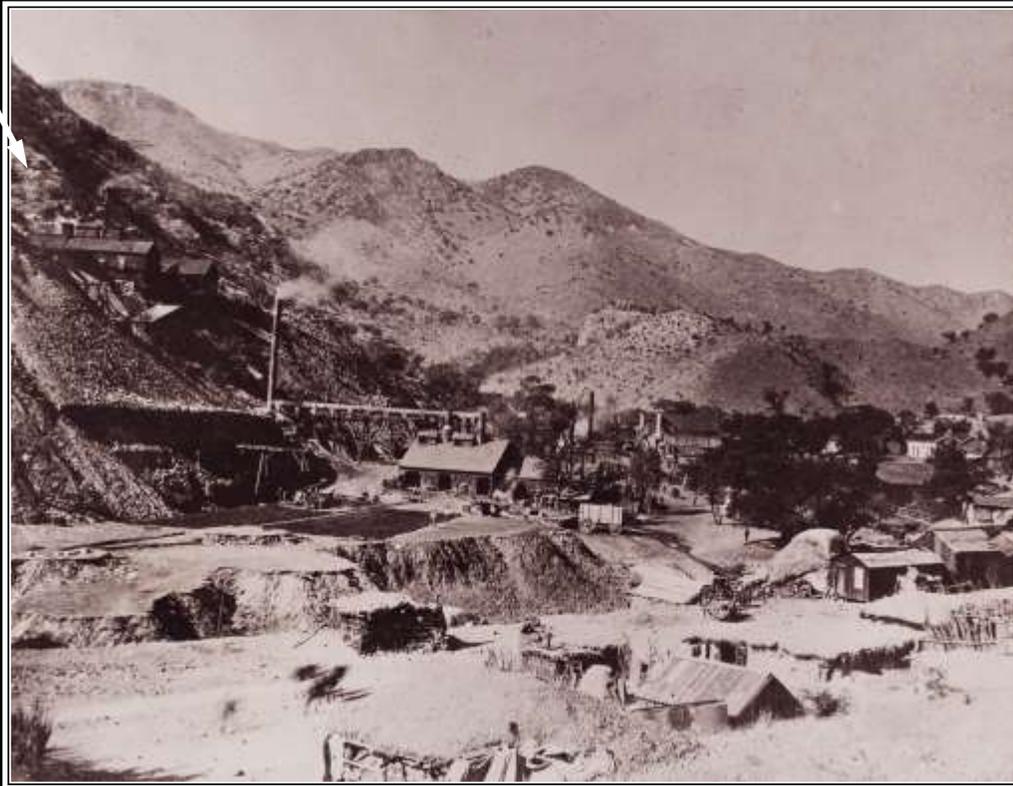
**DR. JAMES DOUGLAS c-1895**  
GRAEME LARKIN COLLECTION

In June of 1881, D. W. James and W. E. Dodge, the principals of Phelps, Dodge, and Company (an old established mercantile firm), asked Dr. James Douglas to examine the Atlanta, a claim adjoining the Copper Queen mine. This claim had been offered to the company for \$40,000. Douglas was chosen because he had previously been in Mule Gulch to visit the Copper Queen (Douglas, 1909). Making the requested examination, Douglas emphatically recommended the purchase, but cautioned that "the risks were too great to be taken by a purchaser who was not able and prepared to lose all that he had invested" (Douglas, 1909). Nevertheless, the risks were accepted, and Phelps Dodge entered the mining field, eventually to become one of the greatest copper companies in the world.

Douglas himself was placed in charge of exploration on the Atlanta claim. An anomaly in this rough, primitive camp, he was well educated, cultured, and sensitive to the needs of others. Though often monetarily poor, he was a man of exceptional integrity. When asked about his fee for examining the Atlanta and given the choice of cash or a share of the mine, he reflected, "the cash was greatly needed, but I told them that as I had advised them to take more than an average risk, I would share it with them. And on that sudden impulse and hasty decision depended my whole subsequent career—successful beyond anything I had ever dreamed of" (Langton, 1940).

For over 2 years Douglas searched and explored, sinking prospect holes on small bunches of ore wherever they could be found: two years of vexation and disappointment. Having spent \$80,000 in these efforts, James and Dodge were thoroughly disheartened—not a single car of ore had been produced.

**THIS SMALL MINE WAS EVERYTHING TO BISBEE  
COPPER QUEEN MINE**



COPPER QUEEN MINE, SMELTER AND BISBEE C- 1883

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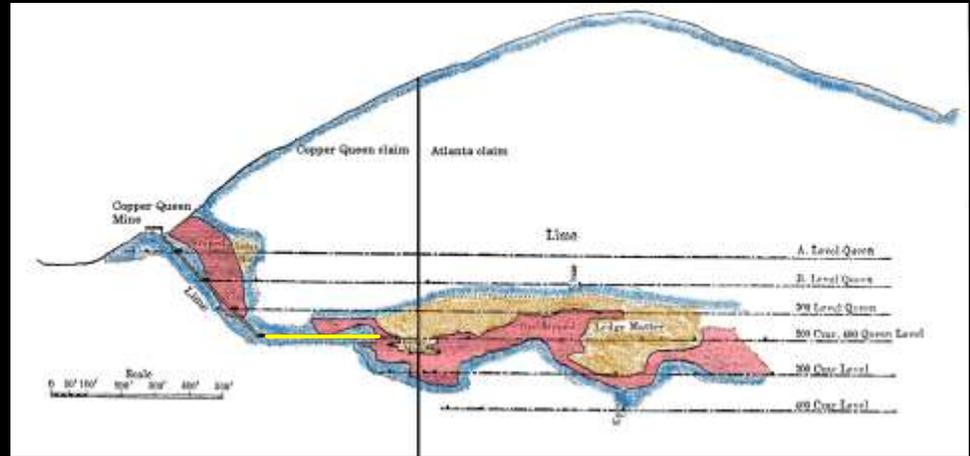
GRAEME LARKIN COLLECTION

In 1883-1884, Bisbee's sole reason for existence was the Copper Queen Mine. It was here that most worked and it was from here that the only real value flowed. If the ores were all mined out and no others found, Bisbee would simply join the already long list of western towns that died when the small mine was worked out.

To be sure, there were others in the area seeking something similar to the Copper Queen and the Copper Prince did produce some copper metal, but the town depended on the Copper Queen for its tenuous existence.

## 1884 AND THINGS LOOK VERY BLEAK

**THE GREAT COPPER QUEEN OREBODY HAD REACHED ITS END JUST BELOW THE 300 LEVEL, BUT A FEW MONTHS ORE REMAINED**



**THE QUEEN FRANTICLY SEARCHED FOR MORE ORE WITH NO LUCK. THE ATLANTA HAD NOW SPENT 3 YEARS AND A HUGE SUM OF MONEY IN A FRUITLESS SEARCH AND WAS NOW MAKING ITS LAST EFFORT, A 400 FOOT SHAFT. THE FUTURE OF BISBEE WAS UNCERTAIN AT BEST.**

**THEN, DURING THE LAST MONTHS OF THE YEAR, THE ATLANTA SHAFT STRUCK ORE AT 210 FEET IN DEPTH. THE COPPER QUEEN HIT THE SAME OREBODY ON THE COPPER QUEEN CLAIM VERY SOON THEREAFTER WITH A DRIFT FROM THE BOTTOM OF THE INCLINE. ~~~~~**

It was now the spring of 1884, the neighboring Copper Queen orebody had suddenly pinched out and only 90 days of ore remained. All efforts at the Copper Queen to find an extension of the orebody failed. Douglas still could not believe that only one orebody was here—surely others must exist nearby.

So it was that James and Dodge, with much misgiving, committed a final \$15,000 for a 400-foot shaft on James Douglas's faith. Douglas reflected, "John Prout and I selected the site where the shaft was to be sunk. But long before it reached the 400-foot level, the gloom which hung over both companies had been dissipated, for at 210 feet from the surface the shaft penetrated a very rich orebody, which was almost simultaneously entered by the level being driven east from the foot of the Copper Queen incline. The Atlanta shaft was sunk for 200 feet through solid ore," (Douglas, 1909).

**BISBEE IS SAVED**

- **BISBEE WAS SAVED THE FATE OF SO MANY WESTERN MINING TOWNS AS THE DISCOVERY OF NEW ORE GAVE IT LIFE, GAVE IT HOPE.**
- **IT ALSO GAVE THE OWNERS OF THE COPPER QUEEN MINE A NEW BASIS TO AGAIN TRY TO SELL THE MINE.**
- **BY NOW THE TOWN WAS MORE THAN JUST A COLLECTION OF SHACKS AND TENTS; IT HAD TAKEN FORM WITH SEVERAL HUNDRED RESIDENTS AND A NUMBER OF SMALL BUSINESSES.**



Bisbee C -1886. Graeme Larkin collection

## THE COPPER QUEEN CONSOLIDATED MINING COMPANY

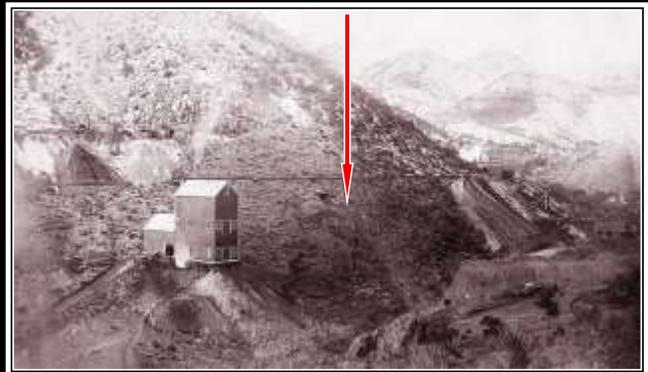
WITH NEW ORE, THE COPPER QUEEN IS MORE EAGER THAN EVER TO SELL. "EXPERTS" ARE BROUGHT IN TO EVALUATE THE MINE. A GREATLY INFLATED PROSPECTUS IS PUT TOGETHER TO MARKET THE PROPERTY, WHICH THE PRESTIGIOUS E & M J CONSIDERED TO BE A FANCIFUL IF NOT FRAUDULENT (FEBRUARY 1885).

AN ENGLISH GROUP MAKES A CONDITIONAL OFFER WHICH WITHDREW AFTER THE E & M J'S SCATHING EDITORIAL (JULY 1885).

THE CZAR SHAFT IS SUNK BY THE QUEEN TO EXPLOIT THE NEW ORES

THE FAILURE OF THIS SALE FORCED THE MERGER WITH THE ATLANTA (AUGUST 1885). THE COPPER QUEEN CONSOLIDATED MINING COMPANY CQCMCo. IS FORMED. PD BECOMES A COPPER PRODUCER *A GIANT IS BORN.*

### SITE OF QUEEN MINE TOUR



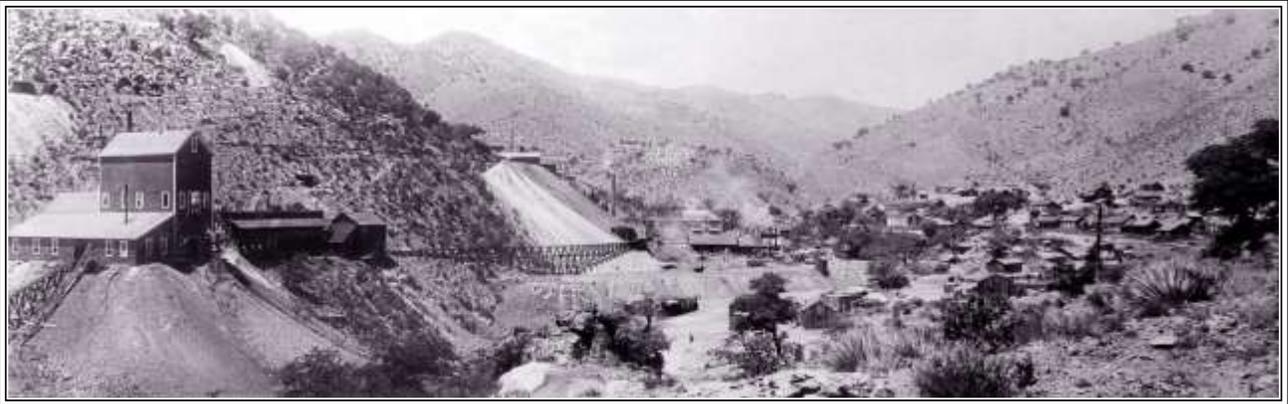
CZAR MINE      1885      COPPER QUEEN MINE

## EXPANSION AND COSTS CONTROL

CZAR MINE

COPPER QUEEN MINE

SMELTER



BISBEE – 1886

GRAEME LARKIN COLLECTION

- **FOLLOWING THE CONSOLIDATION, COPPER PRICES DROPPED TO LEVELS NEVER BEFORE SEEN. THERE WAS NO PROFIT TO BE HAD**
- **COSTS MUST TO BE REDUCED TO MAKE EVEN THE SMALLEST OF RETURN ON THE MASSIVE INVESTMENT MADE IN THE MINE TO DATE**
- **THE COPPER QUEEN INCLINED SHAFT WAS CLOSED AND REPLACED BY THE MORE EFFICIENT, VERTICAL, CZAR SHAFT NEARBY**
- **THE OLD, TWO FURNACE SMELTER WAS TOO SMALL TO KEEP UP WITH THE NEEDED INCREASE IN PRODUCTION**
- **SUBSTANTIAL ADDITIONAL CAPITAL WAS NEEDED AND THE NEWLY FOUND ORES SEEMED SUFFICIENT TO JUSTIFY THE INVESTMENT**

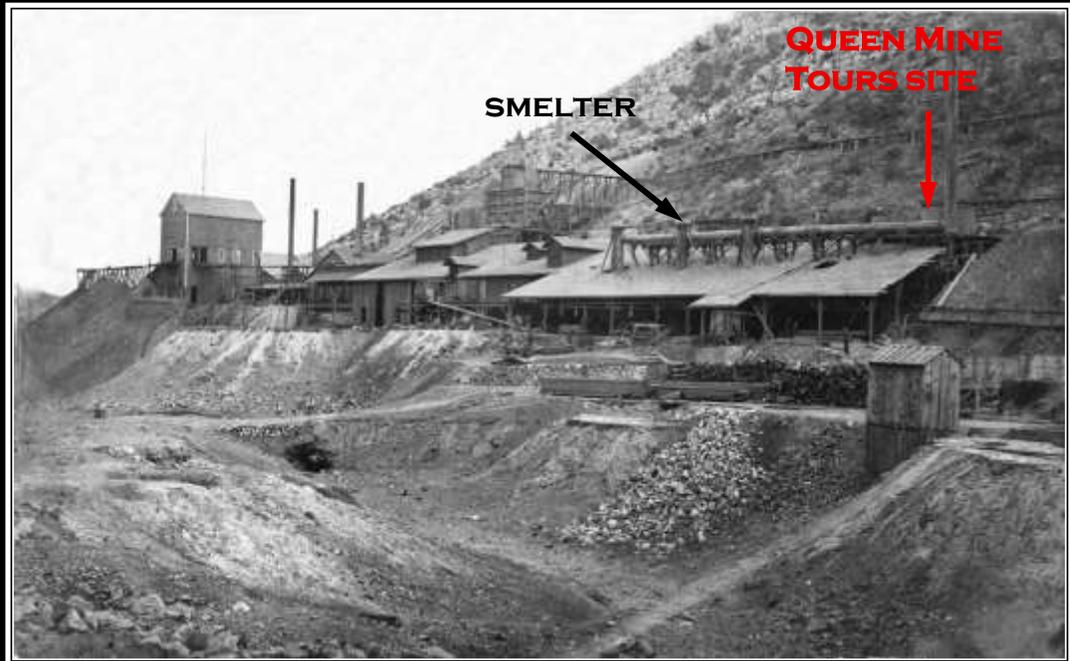
The price of copper continued to fall and, by 1886, the metal from the Queen was selling for only eight cents a pound, down from 20 cents when the mine first opened. There was little profit in the 500,000 pounds a month the mine produced. At this same time, James and Dodge purchased those interests in the Queen held by Martin and Reilly, thereby achieving control of the mine.

Not only did the partners of Phelps Dodge & Co. have the courage to buy, but also to advance the company adequate funds with which to build a new smelter with a capacity of 1 million pounds a month. The hope was that increased production would enable the Copper Queen Company to make a profit. For almost a year the mines were shut down until the new smelter became operational. Only some exploration work and de-watering were carried on at this time.

### EXPANSION OF THE SMELTER REDUCED COST

A NEW THREE FURNACE SMELTER WAS BUILT NEXT TO THE CZAR SHAFT AND QUICKLY EXPANDED TO FOUR FURNACES AS NEW MINES WERE OPENED AND PRODUCTION INCREASED. COSTS DROPPED, BUT SO DID THE MINED GRADE - FROM AN AVERAGE OF GREATER THAN 10% TO JUST OVER 7% COPPER.

THE LARGER,  
MORE  
EFFICIENT  
SMELTER  
ALLOWED  
LOWER  
GRADE ORES  
TO BE  
PROFITABLY  
SMELTED



CZAR MINE AND SMELTER - MARCH 1888

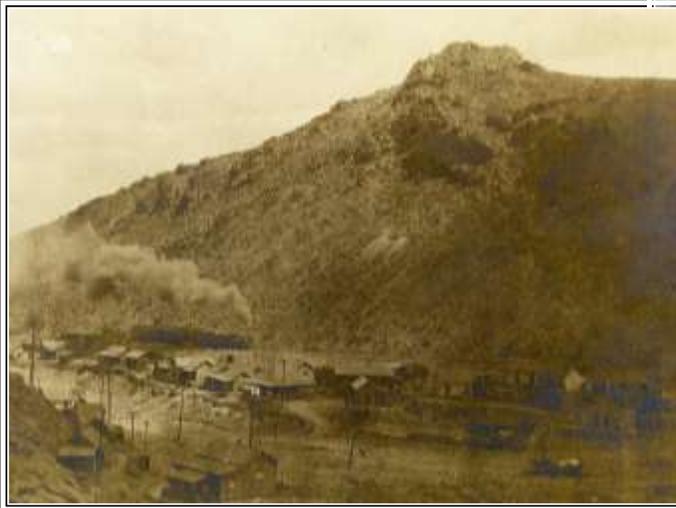
GRAEME LARKIN COLLECTION

### THE COPPER QUEEN BUILDS A RAILROAD

BY LATE 1888 THE COPPER QUEEN RECOGNIZED THAT FURTHER ECONOMY WAS ESSENTIAL TO THE SUCCESSFUL EXPLOITATION OF THE MANY LOWER GRADE ORES BEING FOUND. CHEAPER TRANSPORTATION WAS CRITICAL, A RAILROAD HAD TO BE BUILT TO BISBEE, BUT WHO WOULD DO IT.



FREIGHTING BLACK COPPER BARS FROM THE COPPER QUEEN SMELTER BY MULE TRAIN -1880  
GRAEME LARKIN COLLECTION



A PASSENGER/MAIL TRAIN OF THE EP & SW STEAMS PAST SACRAMENTO HILL - 1898 -GRAEME LARKIN COLLECTION

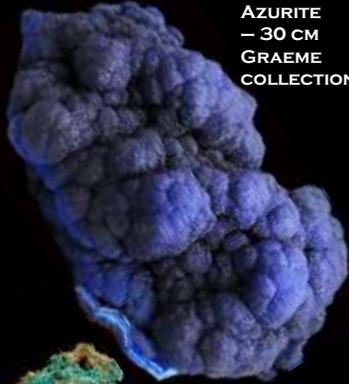
NEITHER THE SANTA FE NOR THE SOUTHERN PACIFIC WAS INTERESTED IN BUILDING A ROAD TO BISBEE. THUS, THE COPPER QUEEN HAD NO CHOICE. BY THE END OF 1889, THE ARIZONA AND SOUTHEASTERN RAILROAD REACHED BISBEE. FREIGHT COST DROPPED FROM \$6.00 PER TON TO \$1.00 PER TON.



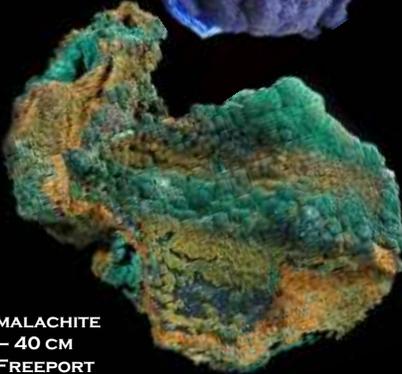
Section of a map of railroads in Arizona as of 1888 - Library of Congress

**NEW MINES, NEW OREBODIES AND A RAILROAD BROUGHT  
BISBEE TO THE FOREFRONT OF ARIZONA MINING CAMPS**

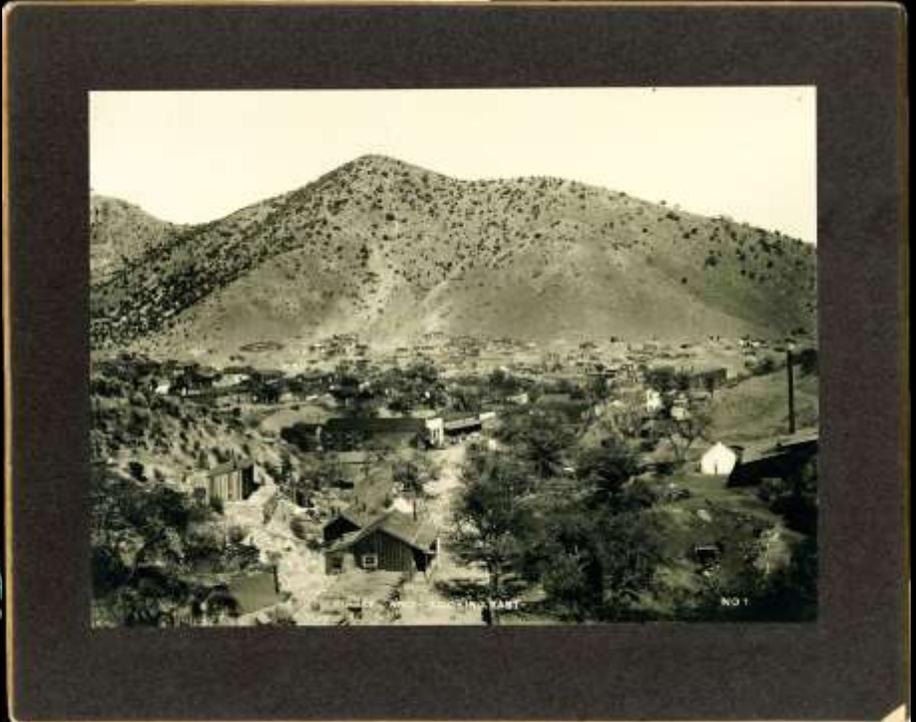
**BY 1891, THE MINES OF THE CQCMCO. AT BISBEE WERE THE RICHEST AND  
MOST FAMOUS IN ARIZONA. THEY WERE ALSO NOTED FOR THEIR FINE  
MINERAL SPECIMENS, SUCH AS THESE FROM THE CZAR MINE.**



AZURITE  
- 30 CM  
GRAEME  
COLLECTION



MALACHITE  
- 40 CM  
FREEPORT  
COLLECTION



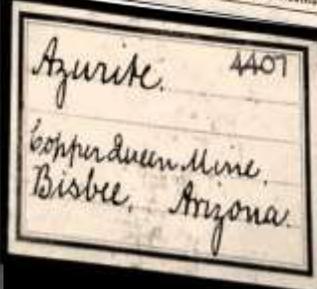
BISBEE - 1891

### BISBEE MINERALS AND THE COPPER QUEEN CONSOLIDATED MINING COMPANY

WONDERFUL MINERAL SPECIMENS WERE ABUNDANT IN THESE NEW MINES, SPECIMENS WHICH WERE MUCH BETTER THAN EVER SEEN FROM ANY MINE ANYWHERE. SOON, THEY WERE VERY MUCH SOUGHT AFTER BY EASTERN MINERAL DEALERS WHO OFTEN VISITED BISBEE. THE CQCMCO. ACTIVELY ASSURED THE PRESERVATION OF THESE FINE MINERALS BY COMPANY COLLECTING AND ALLOWING OTHERS TO COLLECT AS WELL.



**AZURITE**  
HOLBROOK MINE



**SOLD BY A. E. FOOTE**  
1891



**SOLD BY G. L. ENGLISH**  
1891

**MALACHITE**  
PSEUDO AFTER AZURITE  
CZAR MINE

**BUT A NEW AND VERY DIFFERENT USE FOR THESE STRIKINGLY BEAUTIFUL MINERALS WAS ABOUT TO PRESENT ITSELF, ONE IN THE ELUSIVE QUEST FOR STATEHOOD.**

*Azurite, Arizona.*—The finest azurites from any locality in the world (not even excepting Chessy) have been recently secured from the celebrated Copper Queen Mine at Bisbee. Both in size, perfection and brilliancy, they are unsurpassed. As we have personally visited the locality, and as one of our own collectors is constantly on the alert for the best Arizona minerals, we have been able to secure a few of the most remarkable crystals, and large numbers of exceedingly beautiful groups of smaller crystals. The finest crystals brought \$10.00, but as our prices for Arizona specimens are very much lower than those asked for the Chessy specimens, our customers will find Arizona groups at \$2.50 as good as \$10.00 Chessy specimens. Choice crystallized azurite specimens 10 cents to \$10.00.

Excerpt from the George English *Catalogue of Minerals* - 1890

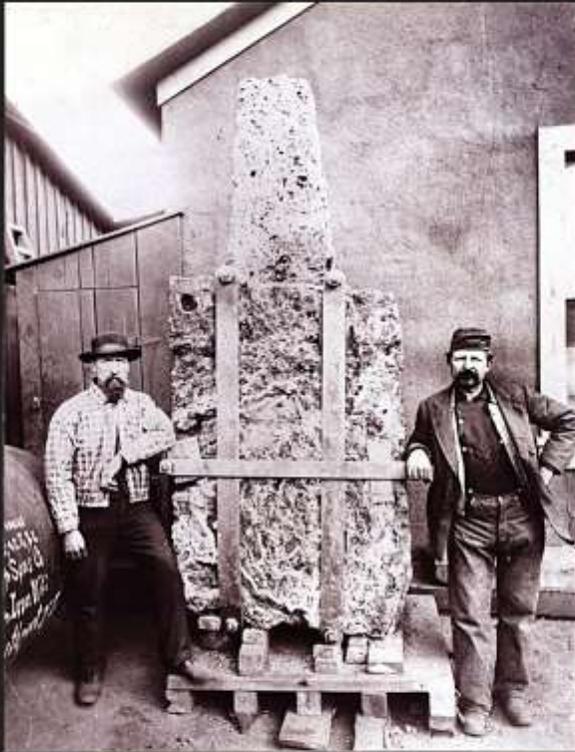
**AN OPPORTUNITY TO DISPEL THE NEGATIVE MYTHS ABOUT THE  
ARIZONA TERRITORY**

**1890 – CONGRESS AUTHORIZES THE WORLD'S COLUMBIAN  
EXHIBITION**

- **HERE WAS THE PLATFORM THAT THE ARIZONA TERRITORY COULD USE TO SHOW AMERICA THAT IT HELD UNIMAGINABLE WEALTH IN ITS MINERAL DEPOSITS AND AGRICULTURAL POTENTIAL.**
- **HOWEVER, ARIZONA GOT OFF TO A SLOW START PREPARING FOR THE PRESTIGIOUS EVENT AND SEEMED DIRECTIONLESS. ENTER THE CQCMCo.**

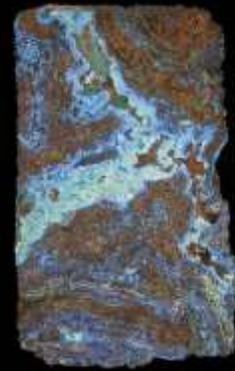
*"THE COPPER QUEEN COMPANY WILL EXHIBIT AT THE WORLD'S FAIR A MAMMOTH SPECIMEN OF ORE FROM THEIR MINES. THE WORK OF CHISELING IT OUT HAS BEEN GOING ON FOR SOME TIME AND GREAT CARE IS BEING TAKEN IN ITS EXTRACTION. IT IS ESTIMATED THAT WHEN READY FOR SHIPMENT IT WILL WEIGH FIVE TONES AND BE IN THE SHAPE OF A BRICK. THE SPECIMEN IS FROM THE BIG STOPE FROM WHICH SUCH BEAUTIFUL SPECIMENS HAVE BEEN TAKEN AND WILL, WITHOUT DOUBT, BE THE MOST ATTRACTIVE SPECIMEN ON EXHIBITION."* CHICAGO DAILY TRIBUNE, MARCH 13 1891; LOS ANGELES TIMES, MARCH 30, 1891

Slide 26



LEFT -AZURITE AND  
MALACHITE BLOCK AT THE  
CZAR MINE – 1891,  
SHORTLY AFTER ITS  
REMOVAL FROM THE MINE.

BISBEE MINING AND HISTORICAL MUSEUM COLLECTION



3 1/2 TON BLOCK IN THE  
AMERICAN MUSEUM

**SOME OF MALACHITE AND AZURITE SPECIMENS  
DISPLAYED BY THE COPPER QUEEN  
AT CHICAGO IN 1893**



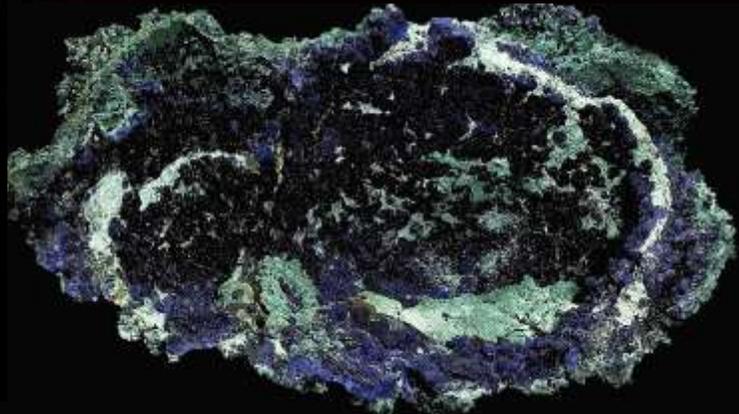
FREEPORT-McMoRAN COLLECTION



FREEPORT-McMoRAN COLLECTION

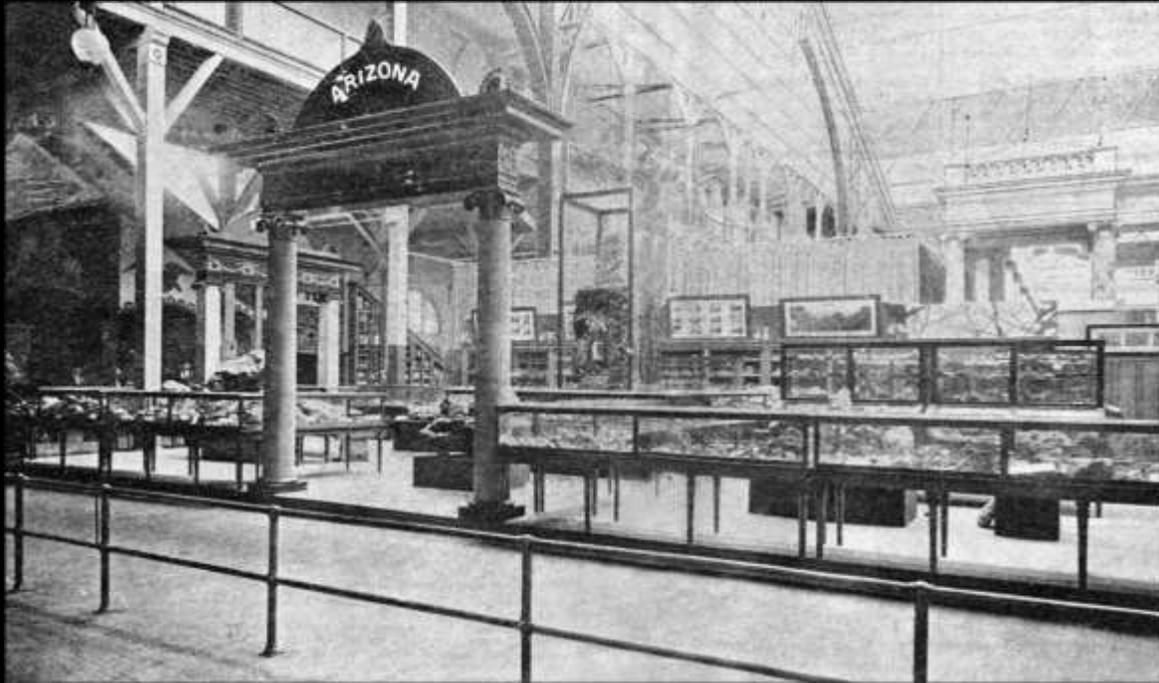


FREEPORT-McMoRAN COLLECTION



FREEPORT-McMoRAN COLLECTION

## THE WORLD'S COLUMBIAN EXHIBITION OF 1893



**THE ARIZONA PAVILION AT THE FAIR WITH THE LARGE BISBEE AZURITE AND MALACHITE BLOCK IN THE CENTER**

Since the quest for statehood began in earnest in 1887 (Wagner, 1980), the Copper Queen had been a strong supporter of independent statehood for Arizona and now stood ready assist. But why should this private company spend the significant sums required for this effort? The Copper Queen was a well-known, closely held and highly profitable company, which neither wanted new shareholders nor needed outside capital. Fundamentally, the owners of the Copper Queen believed in Arizona, its people and that it would advance more assuredly, unencumbered by the less developed and largely agrarian New Mexico. And too, they did need to protect their substantial investments at Bisbee, Morenci and Globe, something that would be simpler for the Territories largest business, if Arizona emerged from the statehood quest alone.

With this need evident, the collecting of mineral specimens for the Arizona Display in the Mines and Mining Hall began early in 1891 (Chicago Tribune, 1891). By this time, the fabled Copper Queen Mine had been closed for several years and replaced by the more efficient and nearby Czar Mine, which exploited the same newly found, rich orebodies. Also, the Holbrook Mine, some 600 feet south and east of the Czar was mining equally good and specimen rich ores. From the many stopes in just these two mines came a broad suite of wonderful minerals in a dizzying

array of hues of blue, green, aqua, red and white. Most of the pieces collected by the Copper Queen were of large size if not huge, with one weighing nearly four tons.

None who saw these natural marvels at “The Fair” could fail to be enchanted by their beauty and impressed by the potential wealth they represented. To further assure this latter point, the Copper Queen also presented a number of models and displays related to mining at Bisbee. One author wrote of the Arizona display:

*“Arizona’s exhibits, adjoining the Colorado section, are displayed to excellent advantage on a raised platform, in the center of which is a monument of copper ore, in rich colors of blue and green, one of the specimens which it is composed weighing nearly 7,000 pounds, and the smallest exceeding 800 pounds. Around it are cases of cuprite, azurite, malachite, and other minerals of brilliant hue, some of the samples from the Holbrook mine [sic], where there is a cave of stalactites, being covered by incrustations of silver” (Bancroft, 1893).*

To be sure, it would be most of another 20 more years before the fruit of Arizona’s struggle for statehood would be realized, but in the years following the Columbian Exhibition, the discourse regarding Arizona as a state began to shift. It was now more one of the ability of self-governance, not economic viability. It would seem that a positive public perception of this distant territory had been achieved.

## INTEREST IN THESE GREAT MINES IS HIGH

**A VERY LIBERAL INFORMATION SHARING AND VISITATION POLICY ON THE PART OF THE CQCMCO., ALLOWED MANY TO ENJOY THE WONDROUS BEAUTY OF THE MANY CAVES FOUND WITH THE RICH OXIDE OREBODIES. TO PREVENT THE COLLAPSE OF THE SURROUNDING GROUND DURING MINING, THESE CAVES WERE ALMOST ALWAYS BACKFILLED FOR SAFETY.**



**CAVE IN THE CZAR MINE C-1895  
(NOTE THE MAN TO THE BOTTOM LEFT  
OF THE LARGE STALACTITE)  
AFTER DOUGLAS 1899**



**MEETING OF THE ARIZONA MASONS IN A CAVE ON THE 200  
LEVEL OF THE CZAR MINE – NOVEMBER 1897 GRAEME LARKIN  
COLLECTION**

One unusual facet of many of the oxide orebodies at Bisbee was their frequent association with caves (*Engineering and Mining Journal*, 1881, 1883; Wendt, 1887; Douglas, 1900). How many caves were encountered during mining is unknown, but it was easily in the hundreds. These caves formed directly over bodies of thoroughly oxidized copper ore and, less commonly, lead ore, but all were associated with abundant iron oxides.

Formation of the caves at Bisbee occurred as the primary sulfides oxidized. The resultant goethite from the full oxidation was often tens of meters thick, soft, even claylike and too weak to support the mass above. This caused the boxwork structures in the lower areas to collapse and compaction to take place, effectively transferring the open spaces from the lower part to the upper portions. This compaction, coupled with the fact that substantially all of the sulfur and a large portion of the iron had been removed, resulted in a lack of support from the host limestone above the oxidation products. The overlying limestones responded variably to the lack of support by subsidence, dilation, and cave development.

These caves are always of very limited extent, typically a single chamber, the size and shape of which was a direct function of the size, shape, and orientation of the original sulfide body, as

well as the nature of the host rock. The oxidation caves at Bisbee were found as isolated, single-chamber openings, and only in the western part of the mineralized area. The vast majority of these caves were seldom more than 30 meters across, and rarely more than 10 meters high. Indeed, many were even smaller, but there were a few notable exceptions. On the 300 level of the Shattuck mine, a well-decorated, crescent-shaped room was encountered that had a length of almost 200 meters, an inclined width of 110 meters and a height of 80 meters.

Often these openings were beautiful beyond description, as they were typically well decorated with cave growths and crystals, but there was more. The otherwise normal speleothems in some parts of many of the caves were tinted varying hues of blue and green by the ever-present copper. This was invariably complemented by a striking red-brown color in others because of iron, creating a handsome contrast with the other, mostly white formations.

Malachite and azurite were the most common and important ore minerals in these caves, occurring as coatings on the walls, stalactites and as linings in the ever-present goethite boxwork. These caves were usually important ore occurrences and as such were almost always mined. In a few, very rare, instances the cave bottoms were not mined and in several of these the author found abundant, late-stage, supergene, copper minerals, including boulders of spongy malachite approaching a meter in size.

## THE COPPER QUEEN CONSOLIDATED DEVELOPS NEW MINES

THE VERY RICH HOLBROOK MINE  
STARTED PRODUCTION IN 1887

BY 1899 THE SPRAY MINE WAS  
CONTRIBUTING TO THE FLOW OF  
COPPER FROM BISBEE

IN 1899, THE GARDNER MINE WAS  
ADDED TO THE GROUP OF COPPER  
QUEEN MINES ~~~~~



GRAEME LARKIN COLLECTION  
HOLBROOK SHAFT & TIMBER YARD C-1900



GRAEME LARKIN COLLECTION  
GARDNER SHAFT C - 1912



GRAEME LARKIN COLLECTION  
SILVER SPRAY SHAFT C - 1901

## AND EXPANDED EVEN MORE TO TREAT SULFIDE ORES



GRAEME LARKIN COLLECTION

LEWIS DOUGLAS (R) AND VISITORS ON TRAIN HAULING SLAG POTS FROM SMELTER TO SLAG DUMP 1893

- **BY 1892 ADDITIONAL MINES WERE IN PRODUCTION AND A NEW TYPE OF COPPER ORE — SULFIDE — WAS BECOMING ABUNDANT. A WAY HAD TO BE FOUND TO MAKE IT PAY**
- **NEW FURNACES FOR SMELTING THESE DIFFICULT ORES WERE SUCCESSFULLY INTRODUCED BY DR. DOUGLAS IN 1894**
- **THIS NEW TECHNIQUE ATTRACTED A GOOD DEAL OF ATTENTION AND MANY VISITORS TO SEE JUST HOW THESE HERETOFORE TROUBLESOME ORES COULD BE TREATED ~~~~~**

Sulfide ores are those minerals which are a combination of copper and sulfur, usually with iron in varying amounts. Examples are chalcocite and covellite, both are copper sulfides and bornite and chalcopyrite which are copper-iron sulfides.

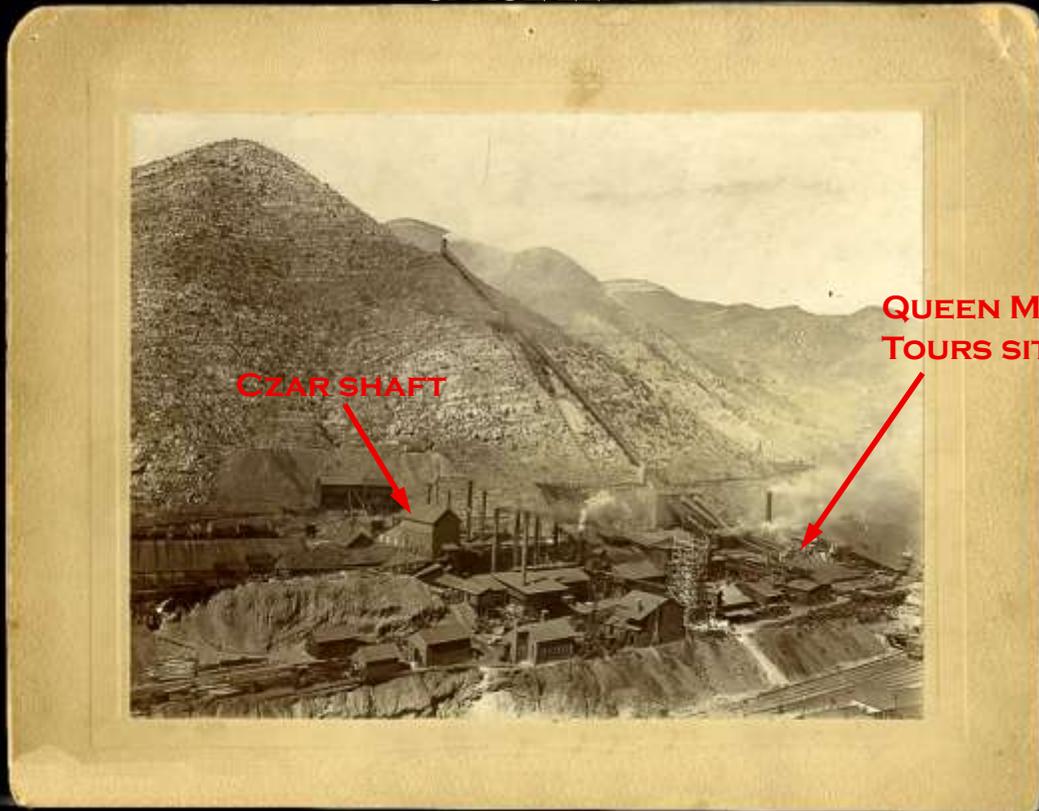
The presence of sulfides was worrisome because sulfur contaminated the black copper bars and this caused them to sell for a lower price. Dr. Douglas introduces a process called the Bessemer, which introduced air and burned the sulfur off completely. The change revolutionized the copper smelting industry and this same basic process was largely used for the next 100 years worldwide.

The downside was the huge volumes of sulfur dioxide smoke generated by burning off the sulfur. It was highly corrosive to metal, killed almost any plant it came in contact with and was disagreeable to breath. It was ten years of exposure to this smoke which stripped Bisbee's hills of what little had escaped the woodcutter's axe.



Smoke clouds from the smelter stack high on Queen Hill cast shadows over hills around Bisbee as can be seen in the above photo. Most of the low level smoke is from the coal-fired steam plants at the Czar and Holbrook Mines, though some is almost assuredly fugitive gasses from the smelting furnaces. USGS photo by F. L. Ransome - 1902

**THE SMELTER WAS EXPANDED YET AGAIN, UNTIL THERE WAS NO SPACE LEFT**



**CZAR MINE AND SMELTER AREA C – 1897**

GRAEME LARKIN COLLECTION

As the mines expanded, more and more lower-grade material was found, much of it sulfide. To be able to economically exploit these lower grade, metallurgically complex materials a larger smelter was needed to take advantage of the economics of scale – it cost very little more to smelt additional tons. That is other than fuel costs, and sulfides mixed with the oxide ores would burn and provide some of the needed heat for smelting.

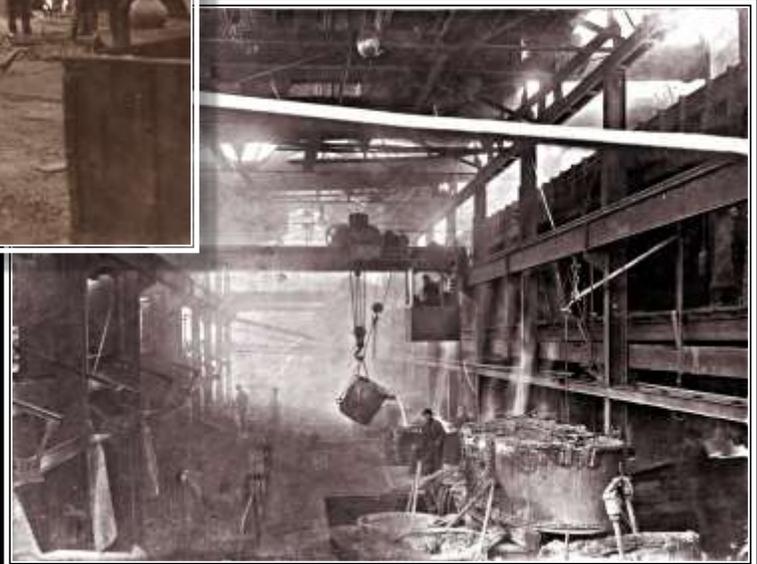
Achieving the right mix of sulfide/non-sulfide ores as well as silica flux was an art, but one which required space to stockpile reasonable amounts of all materials to achieve the desired furnace feed mix.

## INSIDE THE COPPER QUEEN SMELTER - 1898



**LEFT -POURING MATT FROM THE BLAST FURNACE, WHERE THE SULFUR IS BURNED OFF, FOR PLACEMENT INTO THE CONVERTER, WHERE THE COPPER IS SEPARATED FROM THE IRON AND OTHER IMPURITIES INTO A SLAG.**

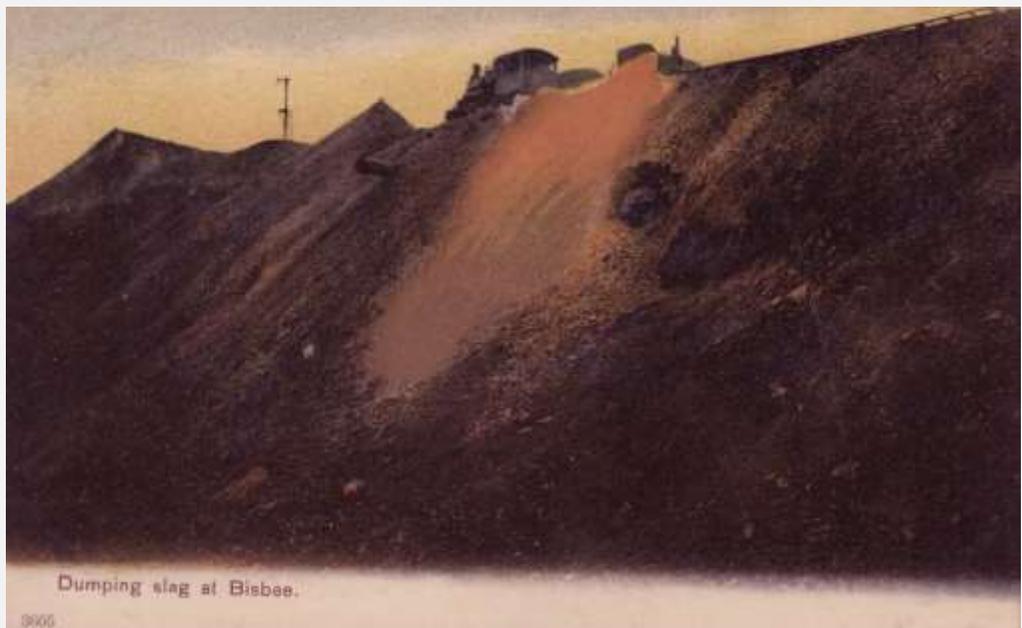
**RIGHT: POURING MOLTEN COPPER TAKEN FROM THE CONVERTER INTO ROTATING CASTING FURNACES TO POUR THE COPPER BARS.**



Postcard view of dumping slag from the Copper Queen smelter at Bisbee C- 1900

The space occupied by the slag dumps was significant with little remaining and was, in part, a driver in seeking a new smelter site

Graeme Larkin collection

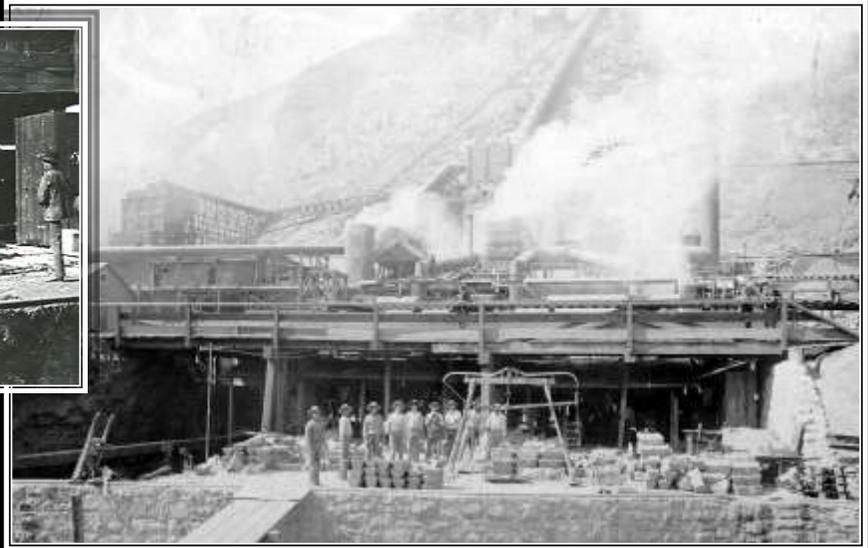


**COPPER BARS WERE ONCE WEIGHED AT THE MINE TOUR SITE**

**BY THE LATE 1890s, THE COPPER QUEEN SMELTER WAS PRODUCING MORE THAN 3 MILLION POUNDS OF COPPER A MONTH IN THE FORM OF BLACK COPPER BARS, EACH OF WHICH WAS WEIGHED PRIOR TO SHIPPING EAST. THIS TOOK PLACE VERY NEAR THE SITE OF TODAY'S QUEEN MINE TOUR.**



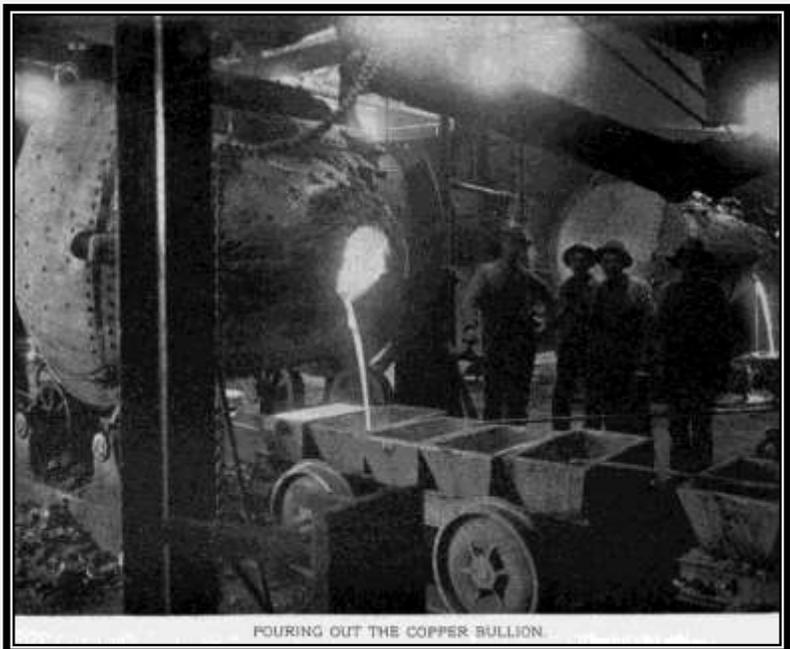
GRAEME LARKIN COLLECTION  
INDIVIDUAL BAR BEING WEIGHED  
-1898-



GRAEME LARKIN COLLECTION  
WEIGHING BLACK COPPER BARS AT THE COPPER QUEEN SMELTER C-1898

Pouring the copper bars in the Copper Queen smelter – 1900

Graeme Larkin collection



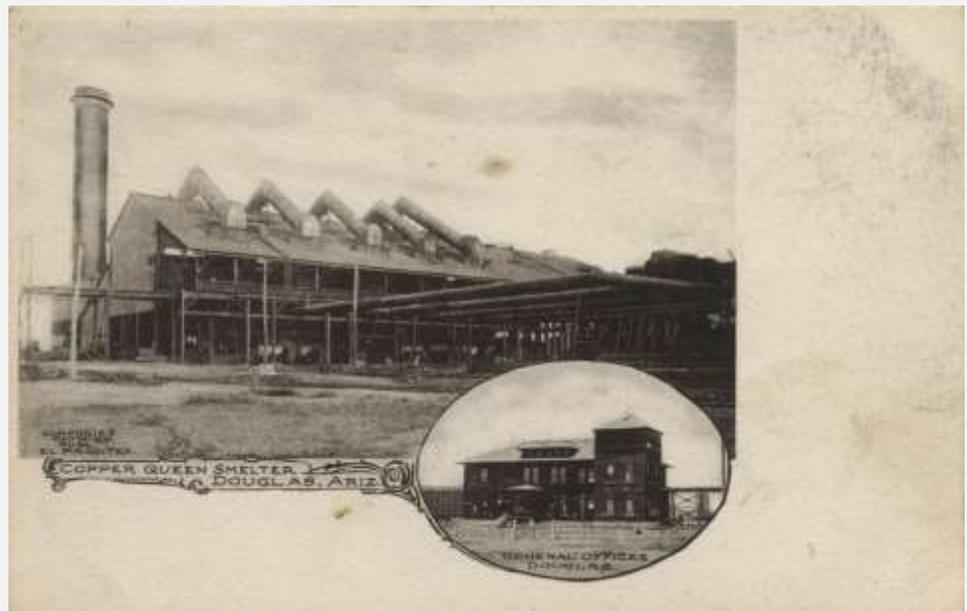
POURING OUT THE COPPER BULLION.

**THE QUEEN MINE TOUR SITS WHERE THE SMELTER WAS**

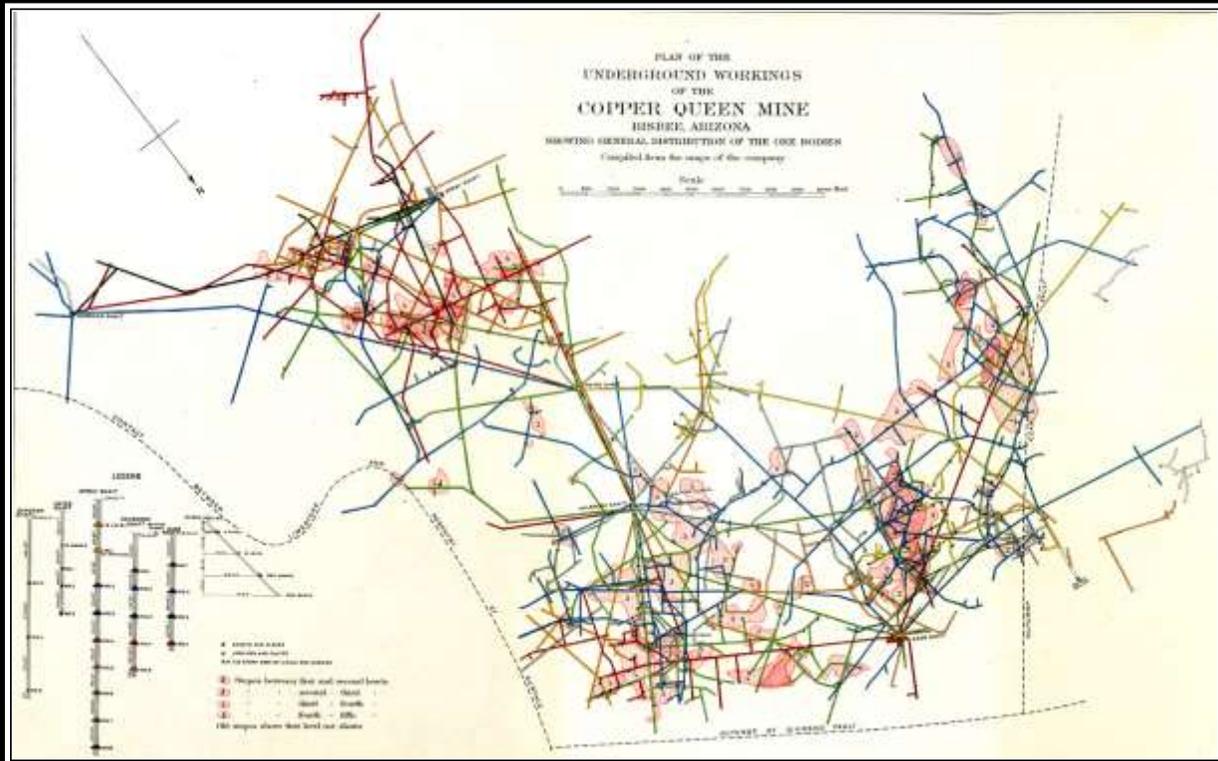
**THE QUEEN MINE TOUR IS LOCATED ON THE SITE OF THE COPPER QUEEN SMELTER WHICH OPERATED AT THIS LOCATION FROM 1888 UNTIL 1904 WHEN THE NEW SMELTER NEAR DOUGLAS CAME INTO PRODUCTION. THE OLD SMELTER WAS A HORRIBLE COLLECTION OF RUSTED BUILDINGS, COMPLETELY COVERING EVER AVAILABLE FLAT SPACE. WITH THE SULFIDE ORES NOW PROCESSED, THE CANYON WAS FILLED WITH MOST A DISAGREEABLE SMOKE. IT WAS COMPLETELY SCRAPPED ONCE CLOSED AFTER HAVING PRODUCED MANY TENS OF MILLIONS OF POUNDS OF COPPER WHICH FED THE AMERICAN INDUSTRIAL MACHINE WHILE HELPING GENERATE JOBS FOR MANY THROUGH OUT THE NATION.**

~~~~~

Postcard view of the Copper Queen Smelter at Douglas – 1904 Graeme Larkin collection



**BY THE TURN OF THE 20<sup>TH</sup> CENTURY, MANY MILES OF WORKINGS  
HAD BEEN CARVED INTO THE LIMESTONES SOUTH AND EAST OF  
BISBEE**



**COMPOSITE PLAN OF THE UNDERGROUND WORKS OF THE MINES OF THE COPPER QUEEN MINING COMPANY - 1902  
(RANSOME - 1904)**

By 1900, the CQCMCo. had carved many, many miles of drifts, raises, stopes and shafts into the limestones, first seeking the ore then mining it, all by hand. Every foot of advance represented hours of hard work by the skilled men employed in the mines. Hand drilling the blast holes, hand mucking the broken rock, hand sorting the ore from the waste in the process, lastly, hand tramping the loaded cars to a shaft for hoisting to the surface if it was ore or to use as backfill, if waste.



A typical drift in limestone at Bisbee C - 1900.  
Graeme Larkin Collection

### OTHER PLAYERS ENTER THE GAME IN A SERIOUS WAY

- AS THE 19<sup>TH</sup> CENTURY CLOSED, THE CQCMCo. WAS THE ONLY SERIOUS OPERATOR IN THE DISTRICT
- THE RICHNESS AND SIZE OF THE DEPOSITS HAD LONG ATTRACTED THE ATTENTION OF MANY AND ALL OF THE GROUND FOR MILES IN EVERY DIRECTION AROUND THE COPPER QUEEN HAD BEEN LOCATED BY MANY
- THE COPPER QUEEN HAD SELECTIVELY PURCHASED MINING CLAIMS IN AREAS THAT IT FELT HAD THE GREATEST PROMISE, BUT THE BISBEE DEPOSITS WERE STILL NOT WELL UNDERSTOOD. NO ONE KNEW WHERE THE LIMITS TO THE ORE MIGHT BE AND A NUMBER OF SMALLER, OFTEN SPECULATOR RUN COMPANIES WERE IN THE AREA AS WELL
- FOR THE MOST PART, THESE COMPANIES WERE MORE INTERESTED IN SELLING STOCK THAN FINDING ORE AND USED THEIR PROXIMITY TO THE QUEEN TO ADVERTISE THEIR POTENTIAL VALUE, BUT THERE WERE SOME REAL PLAYERS IN THIS HIGH RISK, HIGH STAKES GAME
- ENTER THE CALUMET AND ARIZONA, THE SHATTUCK AND ARIZONA, DENN AND ARIZONA, WOLVERINE AND ARIZONA MINING COMPANIES AS WELL AS THE HIGGINS DEVELOPMENT COMPANY
- ALL OF THESE SMALL PLAYERS HELD GOOD GROUND AND DEVELOPED IT IN THE EARLY YEARS OF THE 20<sup>TH</sup> CENTURY
- FROM THESE, THE CALUMET AND ARIZONA WOULD EMERGE AS A FORCE TO RECON WITH FOR THE COPPER QUEEN, A TRUE AND WORTHY CHALLENGER FOR THE FORTUNES THAT LAY, UNDISCOVERED DEEP IN THE LIMESTONES ~~~~~

One of the more egregious offenders in terms of selling worthless stock on properties located at or near Bisbee was the Copper King of Arizona. To the right is a page from an 1898 prospectus for the company showing the proximity of their property to that of the fabled Copper Queen. This scandalous company preyed on uninformed investors for years in spite of abundant negative public information.

Graeme Larkin collection

