

THE CHANGING FACE OF MINING IN ARIZONA¹

by

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Early Mining

The recorded history of mining in what is today Arizona goes back to the 16th century when Spanish explorers Espejo and Farfan reported seeing evidence of mining in what is believed to be the Jerome area. A century later the Jesuit missionary Kino recorded "many rich mines now being developed." (Dunning 1959) While it is believed he was speaking mostly of Sonora Spanish miners did locate and develop a number of mines in the area around Tubac. However, the greatest impetus for mining during the Spanish period occurred as a result of the Bolas de Plata strike at Arizonac, Sonora, in 1736.

Arrival of the Anglo

Extensive, and intensive mining, however, did not occur until the arrival of the Anglo. Initially they worked the mines that the Mexican had abandoned during the brief two decades that the Republic of Mexico claimed the Californias and New Mexico.

Charles D. Poston worked the mines surrounding Tubac, Sylvester Mowry reopened the abandoned Patagonia claims, Peter Brunckow worked a lode claim near present day Tombstone, and Peter Brady established a short-lived mining company at Ajo.

Despite the success enjoyed by Poston and Mowry, the early emphasis on mining was, as it was in most places, on placer mining.

Placer Mining

In the late 1850's several placer strikes led to extensive placer exploration in Arizona. The placer development was set in motion by a strike on the Gila river, approximately nineteen miles east of its juncture with the Colorado river. This was quickly followed by an even larger development on the Colorado river. Both of these camps were short lived. The first, Gila City, left no evidence of its existence and very little physical evidence remains at La Paz. Despite the lack of military protection as the result of the Civil War, prospecting continued into the 1860's.

Walker Mining District, 1863. In 1863, Joseph Reddford Walker, an ex-mountain man, led a party of thirty prospectors from California over the Old Spanish Trail into New Mexico and then back west to Arizona. Heading up the Hassayampa river (which they are reputed to have named) they eventually arrived in the Bradshaw Mountains near present day Prescott. They found gold on a number of creeks in the area, with important strikes on Lynx, Big Bug, and Groom creeks. They built corrals, set up a mining district, established the size of claims, and had a drawing for claims, each man to get two claims of 100 yards each on

each side of the creek. If it was a lode claim the person could go as deep as he wished. They also drew up a set of laws, which prohibited Mexicans, stating

"no Mexican shall have the right to buy take-up, pre-empt a claim on this river for a term of six months to date from the first day of June, 1863 to December 1st, 1863."

One month later the resolution was amended to exclude Chinese from working any portion of the district. (Journal of the Walker and Pioneer Mining Districts)

Rich Hill, 1863. That same year, Pauline Weaver, A.H. Peebles, and Jack Swilling led a group of prospectors up the Hassayampa river where they discovered a rich placer deposit on top of Antelope Hill. The strike was so rich and unusual that the site was renamed Rich Hill. What is really unusual about the Rich Hill strike is that it was on top of a hill and the gold was in cracks and crevices. They actually dug it out with spoons and knives.

Dredges and Giant Monitors. With these successes the Bradshaws continued to attract miners, both placer and lode, until the present day. Two of the more significant placer developments, especially in terms of their ecological impact, were the use of hydraulic mining techniques and dredges to work the streams and rivers of the region. The most dramatic impact occurred in February 1892, when Walnut Grove Dam, built to provide water for a hydraulic operation, collapsed, sending a wall of water down the Hassayampa river. Evidence of the waters destructive force is still evident. Despite the failure of Walnut Grove, hydraulic operations continued in several widely scattered areas of Arizona.

Early Lode Mining

During the same period, attracted by stories of earlier, long abandoned, Spanish mines, a number of enterprising individuals ventured into southern Arizona in an effort to locate and re-open the rich silver deposits of the region. While there were a number of these, the most significant and important for Arizona's becoming a territory was a clerk from San Francisco Charles D. Poston (the Father of Arizona).

Sonora Exploring and Mining Company Landing on the coast of the Gulf of California, Poston's party walked overland to the Tubac settlement where they located the previously worked mines of that region. Returning to San Francisco he was able to get enough financial backing to form the Sonora Exploring and Mining Company and open several mines in the Tubac area. By 1858 he had over 1,000

Mexican miners at work. Poston had a printing press brought in, the first in Arizona. He ran everything, made the laws, printed the money (Boletas), married the miners to the women attracted to the camp. In his memoirs, Poston, who liked to sit in the river and read the newspaper while smoking cigars, said:

We had no law but love, and no occupation but labor. No government, no taxes, no public debt, no politics. It was a community in a perfect state of nature. (Gressinger 1961)

The "perfect state of nature" was upset when a Catholic priest arrived and told the couples they were not legally married. Poston restored harmony but paying the priest to perform marriages, firing off the anvil, and giving each couple a wedding present.

Poston soon went east to get other investors, among them Samuel Colt of Ohio. He also managed to get the commander at Fort Yuma, Samuel P. Heintzelman, to become a shareholder.

Patagonia Mine. Others began to buy or take over other abandoned mines, one of the most important miners being an ex-officer, also from Fort Yuma, Sylvester Mowry, who bought the Patagonia mine, about 30 miles east of Nogales. These people and their financial supporters soon began to agitate for territorial status for the area.

Territorial status came in 1863, and for the first time Arizona had a political identity. With the end of the Civil war, lode mining expanded dramatically. Prospecting was generally confined to the two southernmost of Arizona's physical regions, the Mountain and Basin and Range zones. Significant ore deposits were located in several different and widely scattered parts of the new territory. Eastern and foreign investors were eager to invest capital in mining development. Despite the unrest in the region, its isolation and the lack of rail transportation, the 1870's was a decade of development.

The Boom of the Seventies

Despite the Apache threat the demand for silver during the 1870's, attracted prospectors to the mountains of Arizona. Their determined combing of the mountain ranges of southern and southeastern Arizona led to the establishment of a number of silver mining camps.

Silver King, 1873. In 1873, in an effort to improve control of the Indians, General George Stoneman ordered a military unit to build a road into the Apache area of the Pinal Mountains. One of his soldiers, named Sullivan, picked up some rocks and showed them to Charles G. Mason, a local rancher. Sullivan disappeared but Mason and his friends continued to look for its source and in 1875 they located the vein. They named the mine The Silver King and

established a mining district, the Pioneer Mining District. Ore was \$1,000 per ton, but the expense of pre railroad transportation was high so only the richest ore was shipped. Later a mill built about five miles away at Pinal City. The district soon had enough production to keep a twenty stamp operation capable of crushing 50 - 57 tons of ore a day busy. The mine eventually had seven levels, reaching a depth of 714 feet. Production continued until 1892, with a total production of approximately \$6,500,000. Some effort made to work the mine until the 1920's, but no real profit realized. Today little physical evidence remains of the Silver King, except for portions of the superintendent's house and the wheel ruts near the few foundations of Pinal city.

Tombstone, 1877. However, when one thinks of the silver boom of the 1870's, the district most often recalled is Tombstone. Frederick Brunckow, an employee of the Sonora Exploring and Mining Company, briefly worked a mine in the area in the 1850's; but following his killing in 1857, the region was ignored until Ed Schlieffelin began prospecting there in 1877. Despite being told by soldiers at Fort Huachucha that if he kept on he "would find his tombstone", Schlieffelin persisted. He found some ore and took it to his brother and Al Gird. Gird assayed it at \$40 to \$1700 a ton. The three immediately traveled to the area and staked a number of claims. Despite their attempt to keep it quiet a major camp quickly developed. In March 1880 Ed. sold his share to an eastern syndicate for \$600,000. One year later Gird sold his share for an even greater profit. In character, he shared the extra profit with the Schlieffelins.

Tombstone prospered and in the 1880's it was the largest city in Arizona with over 4,000 people. However, in 1881, as is often the case, even in arid Arizona, they hit water at the 520 foot level. Cornish pumps were installed but the cost of mining increased. A miner's strike in 1884 threatened to raise costs even more. That was followed by a fire in 1886 which destroyed the pump house. When the Sherman Silver Purchase Act was repealed in 1893 all hope of profitable operation was lost and Tombstone, for all practical purposes, ceased operation. By 1893 the camp had produced \$22,860 and although it would eventually produce another \$13 million its hey-day was over. Tombstone was the last of the big silver camps. Silver would still be mined but now the mineral of choice was copper.

Copper

Copper did not come into great demand until the 1890's but some prospecting, identification of sites, and even some limited mining was done in the early post-Civil War years. However, the demand for the red metal would most dramatically change the face of Arizona.

Morenci, 1865. One of the earliest copper camps was in extreme eastern Arizona. In 1865, Henry Clifton, and a number of other prospectors, were mining placer deposits in the San Francisco river area. When the placers he was working there played out Clifton apparently went to Silver

City, New Mexico. In 1872 a group of men from Silver City staked claims in the area - The Arizona Central claim - and established the camp of Clifton. In the group were the Metcalf brothers, Jim and Bob. They were able to get others, including the Lezinsky brothers, to grubstake the operation. The Detroit Copper Company was organized there and the camp that developed, Joy's camp (Morenci), was named after a town in Michigan. Because of the terrain the Lezinsky's developed a narrow gauge railroad from the Longfellow mine down to the smelter. Originally mule drawn, they soon used a small, narrow gauge engine, the first in Arizona, there. The ore was very rich and was carried by wagon to La Junta, Colorado, at that time the nearest railroad connection. Soon sixty to eighty tons of ore was being smelted daily. In 1882, the Lezinsky's sold out to a Scottish Syndicate, the Arizona Copper Company. About the same time, William Church got the Phelps-Dodge Mercantile Company to invest \$50,000 in his operation. With his retirement Phelps Dodge took over his operation.

Globe, 1874. At the same time, in the mountains to the West, another copper camp was being established. In 1874 Ben Regan staked the first claim at Globe.

During the next eleven years eastern money came in, first from Virginia with the creation of the Old Dominion Mine. That was soon followed by the Lewishon Brothers and Phelps Dodge with New York money. In 1891 a railroad connected the camp to the Southern Pacific at Bowie and real expansion set in. Phelps Dodge and the Old Dominion dominated the camp. When copper was discovered at nearby Miami and Superior, the region in south central Arizona became a major producer of copper. Although these camps have closed, the evidence of their existence looms over the towns to this day.

Jerome, 1876. Farther to the West, ironically in the location first identified by the Spanish as having mineral deposits, another series of claims was staked. Indian scout Al Sieber staked the first claim but never worked it. On February 17, 1876, John O'Dougherty, John P. Kelley, and Josiah Riley establish the first developed claims. Others quickly followed. Soon had thirteen active claims in the area which, in 1882, incorporated as the United Verde Copper Company. In 1880, Dr. James Douglas visited the camp and urged its purchase by his clients Logan and Lening of New York City. They bought and then sold an option to Eugene Jerome, who insisted the camp be named for him. The mine had very rich ore but high transportation costs. The ore had to be freighted north to the Santa Fe railroad at Ash Fork, making it difficult to make a profit.

In 1888 Senator William Clark of Butte Montana, having seen some of its ore at the Mining Exposition in New Orleans, bought the United Verde (UV). Douglas had tried to get Phelps Dodge to buy it but they delayed too long. A narrow gauge railroad built from Ash Fork relieved some of the transportation problems. However, Jerome like most mining camps, had much trouble with fire and water.

Adding to its difficulties it was built on a fault and shifting and sliding was a problem. However, the extremely rich ore, running 40%, made it worth the effort. Phelps Dodge eventually bought the United Verde Extension (UVX) and in 1935, after death of Clark, the UV. Throughout the 1930's decade PD took out one million tons of 5-7% ore a year. In the 1940's the quality of ore dropped. By 1942 the mine was down to 4,631 feet. By the time it shut down in 1953, the camp had produced over \$880 million in gold, silver, and copper. Today Jerome, despite developing its "ghost town" image, remains a graphic image of early mining.

Bisbee, 1877. In 1877 John Dunn, a soldier at Fort Huachuca, saw lead in the area east of the fort. He grubstaked George Warren and four friends to search for the deposit. They failed to locate the lead deposit but did discover a rich copper deposit and established the Warren Mining district. Warren, in a drunken moment, lost his share on a horse race bet. When word of the richness of the strike reached San Francisco, investors became interested and bought the Copper Queen for \$20,000. They soon hit 20 % ore.

In 1881, they invited Dr. James Douglas of Phelps Dodge Mercantile Company to come and advise them on a smelting problem. He liked the deposit and got PD to buy into the camp, on an adjoining claim. In 1885 the companies merged. Ore was apparently running out but Wes Howell, a foreman, disobeyed orders to shut down, ran a tunnel and hit rich ore. After that success several additional ore bodies were found. In 1889 the Arizona and Southeastern Railroad completed its connection to the Southern Pacific at Benson and Bisbee's transportation problems were solved. In 1904 the Douglas smelter was "blown in." But the heyday of 20 to 40 percent copper ore was coming to an end. If copper corporations were to make a profit they had to change their way of mining and refining the red metal. While some would continue to mine underground, mining in the twentieth century would be an open pit operation.

Economics of Scale in the Twentieth Century.

New Developments. As mining moved into the twentieth century important changes were taking place. The rapid decline of the richness of the ore forced improvement in mining and refining processes. Economy of scale became the standard for production. Pneumatic drills, the Burleigh "widow-maker" replaced the single and double jacking technique. New techniques, such as "block caving," developed by Louis S. Cates at Ray came into existence. This extensive mining often caused serious subsidence of surface areas but little evidence exists today as it was swallowed up by newer techniques. Block caving was quickly followed by open pit mining, the standard today for most copper mines in Arizona. Dramatic changes were also taking place in refining. At the Inspiration Consolidated Copper Company in Miami experiments led to the

development of the flotation process, the first use of this process in the United States. By 1910 Arizona led the country in copper production. In addition to the increased production from established mines, mines previously too low grade to be profitable could be reworked.

Ajo, 1907. One of the first camps to benefit was Ajo. First identified by Peter Brady in 1854 but the ore was too low grade and the camp too isolated to be worked profitably. During the next fifty years several companies, some of dubious character, worked the deposit. None made a profit or long survived. In 1907, Ira Joralemon, a geologist for Calumet and Arizona Mining Company, persuaded John C. Greenway to take over the Ajo operation. Greenway brought in a brilliant mining engineer, Dr. Louis D. Ricketts, who developed a new method of refining low grade ore. The lack of water was resolved when underground wells were found seven miles north of the mine. A believer in the "city beautiful" movement, Greenway created a carefully designed company town. By April 1917 the New Cornelia mine, an open pit mine, was ready for operation.

Ray, 1908. During the same period an English corporation, Ray Copper Mines Ltd., began developing that operation north of Tucson. Machinery was updated and steam tractors were used to freight the ore to Red Rock on the Southern Pacific line. But instead of the 4% copper expected they only found 2% ore and sold their interest to the Ray Consolidated Company Copper Company. In 1910 Louis Cates took over as manager and in 1911, using his block caving technique, began mining ore.

Bagdad, 1927. Bagdad was initially identified in 1880 by John Lawler but, because of its isolated location and low grade ore, the camp was not developed. In 1906 the Giroux Syndicate gained rights to the mine but was not able to do much. Between 1906 and 1927 a number of companies tried to work the mine, with the greatest effort being that of the Lewishon interests, but had no success. In 1927 the Bagdad Copper Company began operation. The beginning of the Great Depression in 1929 slowed but did not stop their efforts. Despite the depression the company managed to continue development through the 1930's. In 1941 they got a government loan and put in new equipment. The low grade ore made underground mining unprofitable and general manager Ernest R. Dickie began converting to an open pit operation. Dickie used large trucks for haulage and Bagdad became the testing ground for much of the change taking place in large ore trucks. By 1950 all underground mining at Bagdad had ended.

The development of these, and other, mines made mining the leading industry in Arizona and Arizona the leading copper producer in the United States. As Arizona approached statehood nine mining companies dominated the industry, employing nearly two-thirds of all wages' earners in the copper industry in Arizona. More indicative of the industry's importance was the fact that, according to the

1910 census, it employed 18,094 workers, nearly 25% of the wage earners in Arizona. Currently Arizona still produces approximately 60-65% of the copper produced in this country.

Mining Today

Mining in Arizona is again in a state of transition, as always, responding to technological, economic, environmental, and social demands. Open pit mining still dominates the landscape but, if one looks carefully, lode mines, both active and inactive, are common. The greatest change is in the use of a relatively new technique, leaching.

Leaching. Today virtually every mining operation of any size is utilizing, to varying degrees, the process of leaching. At Bisbee and Pinto Valley all of the production is by leaching. At Morenci, still the largest open pit operation in Arizona, 50% of its production is from leaching. At San Manuel, the largest underground operation in the state, an In Situ leaching operation is an important part of their production. Using plastic and clay liners these operations are able to avoid pollution of the water table. Also, recycling the water used in the process results in very little water consumption by the companies.

The Human Side of Mining

The First Miners. The history of mining, however, is more than the identification of ore deposits and the evolution of the technology for extracting and refining those deposits. Essential to a complete understanding of mining history is knowledge of the role played by thousands of nameless, faceless miners struggling to succeed in a harsh, unforgiving environment. Since this was originally the northern frontier of New Spain, the early history of mining in this region was dominated by the Spanish. When the Anglos began to filter into the region they quickly adopted the Spanish techniques, terminology, equipment, and law.

Anglo Domination. However, Anglos brought social concepts, racial beliefs, and ideas of government that quickly pushed the Hispanics of the region out of the camps completely or into inferior positions. (See the earlier account of the Walker District By-Laws.) With the shift to lode mining, with its massive labor demands, control and regulation of the camps became even more Anglicized. While the Mexican was tolerated in most camps, and even eagerly sought out in some camps, (Morenci is a good example) it was only because, to quote a turn of the century report they were "docile, fairly efficient, and used to low pay at home." After the Civil War the make-up of the work force changed dramatically with the arrival of Cornishmen, the "Cousin Jack." Soon these skilled, clannish miners from the deep mines of Cornwall set the standard for hardrock miners in the American West. Later, at the turn of the century: Slovaks, Croatians, Montenegrins, Italians, and

Austrians, fleeing political unrest in southeastern Europe, became an important element in many camps.

Camp Environment. Since most lode mines were located in isolated, rugged mountainous terrain, the camps' facilities were usually as harsh and forbidding as the environment. Financed and controlled by eastern or foreign corporations, whose main interest were in profit and dividends to the stockholders, the initial developments made little effort to ameliorate the poor living conditions. With wages the most controllable expense, corporations viewed the workers as expendable pieces of equipment to be utilized only as long as they were producing. Moving rock was the dominant concern. In most camps a dual wage system, a different scale for Anglo and Mexican performing the same work, was standard. Often "Boletas" or company scrip was used to pay the workers. Because of the isolated location most camps were run by the company: it provided housing, food, and recreation.

Underground mining was hard on man and beast alike. Until electricity became cheaply available, miner and mule labored together to move rock to the surface. A good example of the bond that developed is a popular poem from the period, "My Sweetheart is a mule in the mine."

Social Environment. These conditions soon generated significant characteristics in the work force. Ethnic groups tended to live near their own kind. In most camps segregated enclaves evolved; with their names, "Barrio Mexicano," "Sonora," "Little Italy," "Tintown," or more commonly, "Mexican Camp" indicating their ethnicity. Superintendents and other officials were also segregated as in Warren in the Bisbee district or "Company Hill" in Jerome. As each of these groups struggled to retain its culture the religious and social life of the community became a very rich mosaic. Major holidays such as 4th of July or Cinco de Mayo provided the entire camp with festivities; with sports or demonstrations of mining skills, especially baseball or drilling contests, being major events. At the same time the work force was a very fluid one, especially among the Anglo-American, with the "ten-day" miner being a common element. Although companies, and later the unions, provided libraries and reading rooms, saloons and bordellos were a prominent part of the social life of all camps. This began to change with camp permanence and the arrival of the railroad. Families began to be a part of the community and the wives would not accept nor tolerate the earlier, rougher living and social conditions.

As the demand for skilled miners developed throughout the West, company demands for production and competition for jobs soon led to a hierarchy within the mining camps. At the top were the "Cousin Jacks" Cornishmen, who brought skills learned in the mines of Cornwall.

By the turn of the century the more progressive corporations recognized the wisdom of providing better living conditions,

especially in isolated areas where they had complete control of the camp. The company towns of the period are excellent examples of what a well designed and regulated mining community could (or should) be. Possibly the best example of this is Ajo. Designed by John C. Greenway, an ardent supporter of the "City Beautiful" movement, Ajo remains an outstanding example of what can be achieved when the company is sincerely concerned about the welfare of its employees.

Miners and Unions: The Demand for Bread and Roses Too

Any account of the evolution of mining in Arizona would not be complete without including the contribution of organized labor unions in the growth of the industry. The first attempt by Arizona miners to organize or join a national labor organization took place in Tombstone in 1884. When the Grand Central and Toughnut mines announced a pay cut from \$4.00 to \$3.00 per day the miners protested, organized, and joined the Knights of Labor. The mine managers responded by firing the miners and shutting down the mines, a common practice of the period. Despite support from miners in Bisbee and Globe, the miners could not survive without jobs and the strike failed.

The next confrontation occurred in 1896 when the Old Dominion mine in Globe reduced wages twice in a six-month period and began hiring Mexicans to replace Anglo miners. The miners struck and joined the Western Federation of Miners (WFM). This time the affiliation was successful and the WFM, from its base in Globe, spread into the mining camps of the territory. In 1903, when the territorial legislature passed a bill making eight (8) hours the standard for under-ground miners, the miners at Clifton-Morenci struck in protest when the companies reduced wages proportionately. The strike collapsed when the Territorial Militia and Arizona Rangers moved in and arrested the strike leaders.

In 1905 the struggle between mining companies and organized labor became more aggressive when a new, militant, communistic union, the Industrial Workers of the World, (the I.W.W. or Wobblies) came into existence. The years between 1905 and 1920, especially the World War I period, were years of bitter conflict. Deportation of the I.W.W. members from Jerome and Bisbee in 1917 virtually ended their effectiveness in the state. In 1916, in an effort to better indicate its membership, the WFM changed its name to the International Union of Mine, Mill, and Smelter Workers and it remains the miner's union. Much of the strength of the union was eradicated with the passage, in 1947, of the Right-To-Work measure by the Arizona legislature. Since that time, relations between mining companies and organized labor have slowly shifted in favor of the corporations. Possibly the best example of this changed relationship is the cooperative agreement that currently exists between Magma and its workers

Reclamation Activities

Surface Mining Control and Reclamation Act of 1977.

With the passage of the Surface Mining Control and Reclamation Act, mining entered a new phase. Added to the cost of mining, smelting, or refining was the expense of either protecting the environment during the mining process or restoring the area to something approaching its original state. Depending on the type of waste, the nature of the environment, or both, the process could be both lengthy and expensive.

Today, copper mining is still one of the big "C's" in the economy of Arizona. Arizona companies lead the United States in copper production with approximately 65% of the copper produced in this country coming from Arizona mines. Although the declining richness of the ore has dictated changes in equipment and refining technique, the mining industry of Arizona continues to be a major component of the state's economy.

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