INTRODUCTION

Modern-day Arizona has been shaped by many cultures, inventions and events. Native Americans, Spaniards, Mexicans and Europeans are just a few of the cultures that have made their marks and their homes in the Grand Canyon State. Meanwhile, inventions like air conditioning and events like the building of railroads and freeways have made it possible for people to live comfortably in the desert. What all these cultures, inventions and events have in common is a relationship to mining.

While mining brought people of many cultures to Arizona in search of fortunes, it was the minerals mined, like copper, that provided for better living in the region. Without copper there could be no electricity. And without electricity it is doubtful that Arizona's economy would have grown as it did.

Mining also helped shape the spirit and the personality of the region. Arizonans have long been described as "fiercely independent, adventurous and industrious" — all traits typical of early miners who helped settle this area. By understanding those miners, their challenges and their triumphs, one can better understand how Arizona has changed over the years and continues to prosper. That's also why the Arizona Mining Association produced this booklet.

Each year, the Arizona Mining Association, the individual mining companies; and local historians receive dozens of requests for both information and presentations on mining's role in Arizona history. Arizona students, history buffs of all ages, and others with an interest in Arizona's growth and development are eager to learn about the social, environmental and economic impact of one of Arizona's most significant industries.

It is from these presentations, particularly those of Arizona State University Professor James McBride, that the idea for this book arose.

The Arizona Mining Association, along with our member companies, believes that to best understand the modern state of Arizona, you must also understand our past. It is a story of courage, triumph and commitment shaped largely by individual miners and the mining companies for whom they worked.

Obviously, it is impossible to cover every detail of mining history in a brief booklet like this. Hundreds of books have been written on the subject, and Arizona's mining industry continues to make history every day through technological advancements, positive environmental initiatives and more. We have, however, attempted to touch on key developments and steer you to other resources (see references in back). We've also provided a glossary of names and places that can be used as a quick reference.

We trust that this booklet will provide a deeper understanding of this critical Arizona industry, which not only has a rich history, but still generates billions of dollars for our state, provides thousands of jobs and places us in the international business spotlight.

Larry McBiles
Executive Director
Arizona Foundation for Resource Education

Continue Reading A History of Mining in Arizona
1. THE DEVELOPMENT OF A TERRITORY AND AN INDUSTRY

Although history is the "recorded account or narrative" of the past, a comprehensive history or account of mining in Arizona must begin long before such narratives existed. Archaeological research has revealed that pre-historic peoples of this region used a variety of "mined" resources in their daily lives. There is evidence that as early as 1000 B.C., native inhabitants used cinnabar, coal, turquoise, clay, pigments, and other minerals.

As these early cultures developed, so did their reliance on and utilization of minerals and substances dug from the earth. Stones were chipped and sharpened into a variety of tools. Minerals dug from the earth were used to stain and decorate the body. Native Americans, using fire and water to heat and shatter the rock, fashioned copper and turquoise into jewelry and decorative items. It wasn't until the 16th century, however, when the Spaniards crossed the ocean in search of riches, that the Arizona mining industry began to take shape with the exploration for valuable minerals like gold, silver and copper.

The Spanish Explorers: From Religion to Riches

Spanish mining of the American West was driven by the "Three Gs" (glory, God and gold) — especially God and gold. Spaniards first entered the territory and took formal possession of the Southwest regions of the United States, including what would become Arizona, early in the sixteenth century. Within each Indian settlement, which the Spanish called "pueblo" (meaning village), they assigned a Catholic priest and required the natives to honor and obey both the Catholic church and the Spanish crown. Meanwhile, in addition to bringing their religion into the area, Spanish explorers also saw an opportunity to bring riches in the form of gold, back to their homeland.

Search for the Fabled Cities

The region's wealth first became apparent in 1535 when Alvar Nuñez Cabeza de Vaca and his companions reported hearing tales of cities of gold in the region. Calling their finds the "Seven Cities of Cibola", their reports fired the Spanish imagination with visions of another culture matching the mineral wealth of the Aztec or Inca societies. Five years later, having won the right to search for these fabled cities, Francisco Vasquez de Coronado led a multi-pronged expedition northward from Mexico.

Two years of exploration by Coronado revealed many new and wondrous sights—great canyons, extensive plains, and large new "cows"—but no cities of gold. Reporting this failure to Spain's Viceroy, Antonio Mendoza, ended Spain's pursuit of gold in the region for the next 40 years. The Spaniards, however, continued to push northward in search of glory and God.

That, combined with the Pueblo revolt that occurred when the Indians drove the Spaniards from the territory in 1680, put another temporary end to Spain's mining.

The Arrival of Father Kino

Spain returned to the region in 1686, when the Jesuit missionary Eusebio Francisco Kino was assigned to the area known as Pimeria Alta (upper land of the Pima Indians), which is now Northern Sonora and Southern Arizona. Four years later Kino entered present-day Arizona and established the missions of Guevavi, Tumacacori, and San Xavier del Bac. Although Kino's emphasis was on missionary activity, there are reports of mining by the natives.

In 1697 Capt. Mateo Manje reported Apache accounts of the use of cinnabar (mercury sulfide) for vermilion body paint. It is generally believed that the location was in the Dome Mountain range of present day La Paz county. The Tohono O'odham (Papago) Indians mined Hematite in the Ajo area. Turquoise ornaments were found in the excavation of Snaketown. Turquoise mines were discovered in the Cerbat Mountains, where a shaft was cut 20 to 25 feet into solid rock in the Courtland - Gleeson area of Cochise County and near present day Globe in Gila County.

In addition to mining being done by the natives, the Spaniards also resumed mining. In his accounts of Pimeria Alta, Kino wrote, "many good mines of gold and silver . . . many rich veins
Inspired by mining strikes at Guanajuato, Zacatecas, Durango and Santa Barbara, they began moving up the Rio Grande and resumed the search for gold in 1582 when Antonio de Espejo reported on the richness of the region and the discovery of mines in what is today central Arizona.

The solitary prospector and his burro heading out in search of gold was the image of western mining throughout the early decades.

*Photo Courtesy Arizona Historical Foundation*

Espejo's reports led to the colonization of New Mexico by Juan de Oñate in 1598. From there on the bank of the Rio Grande, Oñate governed the region and oversaw explorations of the territory, including what would later become Arizona. Among their Arizona finds Marcos Farfan de los Godos reported seeing rich veins and staked a number of claims, including an old shaft 18 feet deep, in the area of present-day Jerome. Despite his glowing report on the mineral wealth, the Arizona claims were too far from Spain's capital in New Mexico to be feasibly developed.

now being established." While it is believed he was writing about Northern Sonora, he may have been referring to the area around Tubac, Arizona. This belief is based on the presence of many abandoned Spanish mines in the Tubac-Tumacacori area, which were re-discovered when the Americans arrived in 1848.

The Naming of Arizona

Even the naming of our 48th state, Arizona, may be attributable to mining. Long before establishment of the Arizona territory, when the Spaniards still controlled the region, a ranch hand discovered a rich deposit of virtually pure native silver at Arizonac, a mine located southwest of present-day Nogales. Large nuggets, some as enormous as 3600 pounds, were identified as "Plancas de Plata" (Bolas de Plata). Excited prospectors rushed into the region beginning in 1736. Many believe this strike at Arizonac, which eventually produced more than two tons of silver, was responsible for the naming of this state.

While the silver finds at Arizonac clearly demonstrated the mining potential of present Arizona, Spain's efforts to develop the region were seriously hampered by the Apaches and Navajos. Both tribes resisted the Spaniard's efforts to change their lifestyle, thus limiting mining activity. There was a brief reprieve for Spanish miners in the 1780s when Viceroy Galvez introduced his "Peace by Deceit" plan. This plan, which included providing the Indians with food, guns and whiskey, provided a period of relative calm during which some mining was conducted. That period of peace and prosperity ended in 1810 with Father Hidalgo's "Grito de Dolores" and Mexico's long War of Independence.

By 1821 when Mexico achieved independence from Spain, the marauding Indians had forced the civilized peoples of Pimeria Alta into the protection of the presidios at Tubac and Tucson, especially Tucson. Mexico's internal problems left the northern frontier to fend for itself and at the mercy of the warlike natives. Mining (and all other economic activity) was too risky, and development of the region did not resume until the Americans arrived in 1848 following the Mexican-American War.

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Manifest Destiny: The Beginning of American Mining

The United States' military conquest in the Mexican-American War (1846-1848) made all of the territory East of the Rio Grande, New Mexico and upper California part of the U.S. Ironically, the discovery of gold in California, occurring just nine days before the ending of the war through signing of the Treaty of Guadalupe Hidalgo, focused the attention of the entire country, indeed, the world, on what was now the American Southwest.

American mining in the region had actually begun several years before that Treaty. In 1847 Tom Childs, Jr. led a party of 19 Americans into present-day Arizona to help locate the legendary Plancas de Plata, where early silver lodes had been discovered. Before being turned back by Mexican nationals, Childs was able to locate abandoned copper mines at Ajo.

Describing the Ajo mines as "open cuts in the hillsides and a shaft at least 60 feet deep", Childs said there were still notched ladders and leather ore buckets in the unworked shafts.

Conflict over the extension of slavery led to The Compromise of 1850, which included creation of the Territory of New Mexico. The territory encompassed much of the American Southwest from the 37th parallel of latitude to the Mexican border and stretching all the way from Texas to California. This was followed in 1853 by the signing of the Gadsden Purchase in which the remainder of the territory, including what would become the southern third of the territory of Arizona, was bought by the U.S.

During the next two decades Americans mined the area using several approaches. One involved locating abandoned Spanish mines. At the same time Americans were busy looking for new deposits. This method, called "placer" mining, involved no excavating. Instead, minerals accumulating in stream beds were washed out by panning, sluicing, hydraulic nozzles or dredging. A dry method of placer mining, involving the use of pans and rockers, was also used.

Besides placer mining the other approach was to concentrate the search for mineral wealth in the less explored southwestern part of the territory. Later, new technologies such as lode, open pit and leaching would be discovered and used to develop mineral deposits unreachable by the early American miners.

From Gold, to Silver, to Copper

Just as the introduction of new technologies over time changed the process by which Americans mined in the Southwest, both technologies and economics also changed what minerals were pursued.

American mining in the Southwest began in earnest with the 1849 California Gold Rush. Although gold continued to be mined heavily for nearly a quarter of a century afterwards it gave way, first to silver mining, and later to copper. Today, gold remains a significant part of the refining process. Contrary to some reports, however, it does not pay the cost of mining other minerals.

With fewer placer deposits and a decline in the output of gold from California in 1873, silver became an increasingly important mineral. This led to a demand by westerners for a fixed price ratio (16 to 1) between silver and gold and federal support for silver. This led, in turn, to passage of the Sherman Silver Purchase Act, which required that the government purchase and
significant part of the retinning process. Contrary to some coin a fixed amount of silver each month. Although the Act kept the demand for silver high for the next twenty years, the fight for a bi-metallic currency system ended in 1893 when Congress repealed the legislation. This repeal of the Sherman Silver Purchase Act passed despite an impassioned plea by William J. Bryan, remembered as his "Cross of Gold" speech.

The government’s decision to stop coining silver and a subsequent drop in silver prices coincided with one of the most important discoveries of the modern age — the development of the alternating current (AC) system of electricity by Nikola Tesla, a former employee of Thomas Edison. Contracting with Westinghouse, Tesla demonstrated his AC power at the World Exposition in Chicago in 1893. This system, which was superior to Edison's direct current, provided for long-distance transmission of electricity and greatly expanded the use of electricity, using copper as a conductor. The birth of the electrical age was, in turn, a major boon to the copper industry. Copper had not only been proven as an excellent conductor of electricity, it was also plentiful in supply and inexpensive.

The next section describes in greater detail the transition from the rugged gold and silver prospecting of early Arizonans and other southwestern miners to the sophisticated, high technology industry that typifies copper mining today.

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**Drilling Contest**

Proud of their skill at single and double jacking hardrock, miners soon began to compete with each other and drilling contests were a major event at major holidays. On important holidays, such as the 4th of July or Labor Day, the larger camps, such as this one at Bisbee in 1904, would attract top miners from all over the West. Prizes offered added up to thousands of dollars. All matches were for fifteen minutes. The record for single jacking was 26 5/8" with the double jacking record being 46 3/4".

*Photo courtesy of the Bisbee Mining & Historical Museum.*
2. FROM GOLD, TO SILVER, TO COPPER

By the early 1850s, individual prospectors and small groups of miners were actively searching for placer deposits throughout the American Southwest. The simplest and easiest method of finding gold, placer mining, was merely finding the gold, which had eroded from veins as a result of alluvial or weathering action and then had been carried downstream. That bit of gold, depending on weight or stream velocity, would eventually be deposited, remaining in place until discovery by a prospector(s) using a pan, rocker or sluice.

ARIZONA'S FIRST GOLD RUSH

Francis X. Aubry reported seeing evidence of gold floating on the Colorado River in 1853 but said it was of little value, and nothing was done to develop it. Five years later, Arizona's first major gold rush occurred when Jacob Snively led a party of prospectors to a placer deposit on the Gila River about 19 miles east of its juncture with the Colorado River. A booming camp, Gila City soon developed. By 1861, there were 1,000 miners in the camp, which was described as follows by J. Ross Brown, a journalist who traveled extensively in the West:

"Enterprising men hurried to the spot with barrels of whiskey and billiard tables; Jewish merchants came with ready-made clothing and fancy wares; traders crowded in with wagons-loads of pork and beans; and gamblers came with cards and monte-tables. There was everything in Gila City within a few months but a church and a jail,"

Despite early riches and fast growth, the Gila City placer deposits soon played out. Later, when the river shifted its course, the camp was abandoned and there is no longer any evidence of its existence.

The next important placer strike occurred in 1862 when the ex-mountain man, Paulino Weaver, led a group of prospectors to the Colorado River above Yuma and discovered the La Paz placer deposits. A major camp quickly developed. By year's end La Paz had 5,000 residents, was important enough to be the first capital of Yuma County, and was believed by many to be the logical choice for the territorial capital. As had happened with Gila City, however, the river shifted leaving the placer deposits high and dry about 12 miles from water. When the deposits played out, La Paz was abandoned, and today, little remains of what was once Arizona's largest city.

Rather than work the mine, he sold the ore at $15 a ton. Purchasers had to transport the ore to the Hassayampa River, where a number of arrastras had been built for processing. Wickenburg later sold the mine (named the Vulture Mine because of the story of its origins) for $68,000. Although productive until well into the 20th century the Vulture Mine had many problems, including the degree of high-grading (stealing of particularly rich nuggets or pieces of ore) by the miners. Some historians believe the Vulture Mine was also the source of the gold for the Lost Dutchman Legend.

The next decade saw continued placer activity but few major discoveries. Possibly the most important strike was at Greererville in the southeastern part of the territory. Discovered in 1874 by A. Smith, the Greererville placers quickly became a camp of 200 miners. It was said that they could make $10 per day by dry washing. Water had to be carried four miles from the river and cost three cents a gallon. By 1880, the richer gravels had been worked over, and the camp was, for all intents and purposes, abandoned.

Finding Lost Mines

Concurrent with placer development, the search for abandoned Spanish lode mines produced dramatic results. In 1854 Peter Brady led twenty men into the Ajo region, the same area earlier explored by Tom Childs. As with his predecessor, Childs, it is generally believed that Brady was also searching for the Plancas de Plata. Upon reaching the Ajo region, Brady established the
As technology changed hardrock mining, the pneumatic drill replaced hand drilling. However, the pneumatic drill created new health problems for the miner and soon became identified by the miners as the "widow maker." The exhaust air kept granite particles in the air, these particles when inhaled by the miner cut up the lungs, developed scar tissue, a condition known as "silicosis" and often led to an early death for the miner. Later water was used to keep the dust down, not only making it healthier for the miner but also making the drill more efficient.

Photo Courtesy Sharlot Hall Museum Library/Archives. Prescott, Arizona

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**RIVERS AND RICHES**

Joseph Rutherford Walker, another ex-mountaineer, led a party of 30 prospectors from California over the Old Spanish Trail into New Mexico and then back west to Arizona in 1863. 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 several area creeks, including Lynx, Big Bug and Groom. They built corrals, set up a mining district, established claims, and had a drawing, with each man receiving two claims of 100 yards each on either side of the creek. If it was a lode claim, the person could go as deep as he wished. They also drew up laws that prohibited Mexicans. The resolution, which originally read ". . . no Mexican shall have the right to buy, take up, or pre-empt a claim on this river for a term of six months to date from the first day of June, 1863 to December 1, 1863," was amended one month later to also exclude Chinese from working any portion of the district.
That same year, 1863, Paulino 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. The story of the Rich Hill strike is a typical mining story in which one of the party went looking for a strayed burro and found gold. Some have said it is proof that "any stupid ass" can find gold. 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. Prospectors actually dug it out with spoons and knives. Before it played out, the Rich Hill deposit produced more than one-half million dollars in gold.

Also in 1863, Henry Wickenburg, apparently attracted by the Rich Hill stories and the Walker party’s reports of success in the Bradshaw Mountains, prospected up the Hassayampa River, near what is present day Wickenburg. Legend has it that Wickenburg threw a rock at a vulture (some say at his burro). When the rock broke, Wickenburg saw that it contained gold ore. Although 12 miles from the river, Wickenburg established a claim.

A little known (and little used in Arizona) phase of placer mining was hydraulic mining. Developed in California and used extensively there, especially by Chinese miners, this method of mining placer deposits was used at several sites in Arizona. This picture is from a Lynx Creek site but hydraulic mining operations were used at several other locations, most notably at Greaterville in southern Arizona and Walnut Grove in the Bradshaws.

Photo Courtesy Sharlott Hall Museum Library/Archives. Prescott, Arizona

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From Territory to State
The growth of lode mining brought a number of changes to the region, including the arrival of a new breed of workers and investors. A knowledge of geology and mineralogy was necessary to locate ore deposits and veins. Lode mining, unlike placer mining, required large numbers of workers, including skilled miners and unskilled laborers, skilled engineers, and massive amounts of capital. It often took months or years before a mine showed a profit, if it did at all. Once the ore was mined, it had to be refined, another long and expensive process. Most of the early ore mined in Arizona was sent east to be smelted, some of it as far as Swansea, England. Since transportation was a major expense for all mines, only the richest ore was shipped.

As the number of American miners and mine investors grew, their desire to separate the area from the territory of New Mexico soon surfaced and quickly became a vigorous movement. Initially, their plan was to divide New Mexico territory horizontally at about the 34th parallel, creating a long, narrow territory reaching from Texas to California.

Between 1856 and 1862, fifteen measures were introduced to develop the Arizona territory, but Congress refused to take action. In 1860 citizens drew up boundaries, created four counties, elected a governor and sent a representative to Washington, but Congress still refused to recognize the governor. Sylvester Mowry went to Washington D.C. and had a pamphlet printed, Memoir on the Proposed Territory of Arizona. Although it was the first publication exclusively on Arizona, the pamphlet brought no action. Sylvester Mowry even fought a duel, having challenged an editor who was critical of his efforts.

Much of the delay in creating the Territory of Arizona was the nation's involvement in the Civil War. With the war being fought in the eastern part of the country, military posts in Arizona were abandoned. Unfortunately, just a month prior to the outbreak of war, a confrontation between Lt. George N. Bascom and Chiracahua leader Cochise resulted in open warfare by the Chiracahua. The withdrawal of the army in April 1861 left the mines and ranches of Arizona defenseless. Apaches swept through the country killing, destroying and burning at will.

Supporters for territorial status persisted and eventually their work, along with the efforts of their investors, paid off. On February 24, 1863, President Abraham Lincoln signed the measure creating the Territory of Arizona. During the same period a U.S. military unit from California drove Confederate forces from Arizona. Their commander, displaying a strong sense of honor and character, cast off his commission and resigned in protest at the lower rank he was given.

By 1893 it had produced $22,860 and would eventually produce another $13 million, but its boom was over.

The Copper Crusade
Fortunately for miners the decline in demand for silver was matched with an increasing demand for copper. Although some prospecting, identification of sites, and even limited mining was done earlier, copper mining did not become important until the 1890s. In most cases the copper camps of the 1890s were camps that had earlier mined other minerals, usually silver.

One of the earliest of the important copper camps in 1865, was initially located by Henry Clifton in extreme eastern Arizona in the San Francisco river area. When the placers he was working there played out, he apparently went to Silver City, New Mexico.
interest in mining, recommended placing the capital of the territory near the mining camps in the Bradshaw Mountains. His recommendation was followed, making Prescott the capital of Arizona. The capital would be moved several times before landing, in 1889, in Phoenix, where it remains today.

A group of men from Silver City staked claims in Arizona in 1872, establishing the camp of Clifton — The Arizona Central claim. The group included the Metcalf brothers, Jim and Bob. They were able to persuade others, including the Lezinsky brothers, to grubstake their operation. The camp that developed was named Morenci after a town in Michigan.

Continuing the Michigan connection, The Detroit Copper Company was organized in Clifton/Morenci. Because of the terrain, the Lezinsky brothers developed a narrow gauge railroad and a long incline from the Longfellow mine down to the smelter. Originally mule drawn, it later used a small, narrow gauge engine, which was the first in Arizona. Between sixty and eighty tons of rich ore were smelted daily and carried by wagon to La Junta, Colorado. The brothers sold out to a Scottish syndicate, the Arizona Copper Company, in 1882. About the same time, William Church persuaded the Phelps-Dodge Mercantile Company to invest $50,000 in his operation. When he finally retired in 1895, Church sold his interest to Phelps Dodge.

Ben Regan established the first claim at Globe in 1874. The name of the camp comes from a story, probably apocryphal, of the discovery of a large silver nugget on which an image of the earth was etched. In 1881 Regan sold his claim to the Globe Mining Company.

Also in 1881 the Old Dominion Mining Company (OD) was formed. One year later, the two firms merged, and Phelps Dodge (PD) entered the camp, buying some mines in the area. The Lewishon Brothers of New York bought the OD in 1895. The expense of freighting ore by 20 mule team wagons was eliminated when they built a railroad to the Southern Pacific at Bowie.

With good transportation available, the camp grew rapidly. When the OD ran into water however, the Lewishons were ready to sell. PD bought their interest in 1903. Other mines came into the area afterwards, but the OD and PD controlled the camp.

In 1876 claims were established in Central Arizona at the deposits first identified by the Spanish almost 300 years earlier. In 1880 Dr. James Douglas visited the camp and persuaded his New York clients to purchase the claims. When they sold an option to Eugene Jerome, he insisted the camp be named for him. These claims were incorporated as the United Verde Copper Company (UV) in 1882. The UV had rich ore but high transportation costs. Ore had to be freighted to Ash Fork, making it difficult to make a profit. In 1888 Senator William Clark of Butte, Montana bought the United Verde. Transportation

Arizona’s Silver Boom

With peace restored and the army to protect them, prospectors again combed the mountains of Arizona for mineral deposits, this time seeking silver. Silver prices were high, there was plenty of rich ore and it was near the surface. As a result silver mining boomed. Much of the early development was in the Bradshaw Mountains where numerous camps sprang up. Prospecting soon spread to other parts of the territory. In 1883 a soldier in a military road building unit in the Pinal Mountains discovered ore that eventually led to the Silver King Mine.

The real boom town of silver camps evolved from discoveries made by Ed Schleffelin, prospecting in the southeastern part of the territory. Although army patrols from Fort Huachuca warned that prospecting in Apache land all he would find would be his tombstone, Schleffelin persisted. When he struck it rich, in a bit of bravado, he named the camp Tombstone. Within a few months, hundreds of miners flooded into the camp. By 1881
Tombstone had a population of 4,000, making it Arizona's largest town and the biggest community between New Orleans and San Francisco.

Tombstone's history is typical of many of Arizona's rugged and isolated lode mining camps where getting ore to smelters or markets created a major transportation expense. Water, both the lack of and too much, was also often a problem. For example, at the 520 foot level, lode miners hit water, greatly increasing ore removal costs.

As Arizona's mining companies became larger and more impersonal, silver miners formed societies and unions to provide work and social benefits. In 1884 Tombstone's miners formed a union affiliated with the Knights of Labor and demanded a pay increase.

In 1886 fire swept the camp destroying the pump house. The 1893 repeal of the Sherman Silver Purchase Act was the final straw. The mines began to shut down, and Tombstone, despite its boast of being "The Town Too Tough To Die," began to wither away.

costs were reduced by building a narrow gauge railroad to Jerome Junction to connect with the Santa Fe, Prescott, and Phoenix railroads, which provided rail transportation north to the main line at Ash Fork.

Besides the usual mining camp difficulties with water and fire, Jerome had an unusual problem. It was built on a fault. This made following the vein difficult and later, as a result of extensive tunneling and blasting, would cause the camp to slide downhill. To the east of the fault, the Little Daisy Mine, incorporated as the United Verde Extension (UVX) after years of exploration, hit 45 percent copper ore. Developed by James Douglas and PD, the UVX produced $125 million in ore. In 1935 after the death of Clark, PD bought the UV. By its closure in 1953, Jerome had produced over $600 million in gold, silver, and copper.
4. THE TRIUMPH OF TECHNOLOGY
At the same time in the south-eastern corner of the territory, George Warren and four friends — grubstaked by a soldier at Fort Huachuca — discovered a rich copper deposit, the Copper Queen, and established the Warren Mining district in Bisbee. Warren lost his share betting he could outrun a horse over a 100 yard course, and his friends sold their interest to San Francisco investors. They soon hit 20 percent ore. Dr. James Douglas, invited to advise them about a smelting problem, persuaded PD to buy an adjoining claim. In 1885 the companies merged. Ore was apparently running out, but Wes Howell, disobeying orders, ran a tunnel and hit rich ore. After that success, several additional ore bodies were found, and Bisbee developed into one of the premier copper camps in the country.

As mining moved into the twentieth century, important changes were taking place. The rapid decline of the richness of the ore forced improvements in mining and refining processes. Economies 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 was quickly followed by open pit mining, the standard today for most Arizona copper mines.

Dramatic changes were also taking place in refining. At the Inspiration Consolidated Copper Company in Miami, experiments led to the development of the floatation process, the first use of this process in the United States. By 1910 Arizona was leading the country in copper production. Besides increased production from established mines, material that was previously too low grade to be profitable could now be developed by using the new processes.

One of the first open pit mines was at Ajo. First identified by Peter Brady in 1854, the mine was originally considered too low grade and isolated to be worked profitably. During the next fifty years several companies (including some of dubious character) worked the deposit, though none made a profit or survived. Ira Joralemon, a geologist for Calumet and Arizona Mining Company, encouraged John C. Greenway to assume the Ajo operation in 1907. 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, Ajo’s open pit mine, was ready for operation.

5. THE PEOPLE BEHIND THE PROCESS
The history of mining is more than the identification of ore deposits and the evolution of 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. In this section we’ll look at the people who drove the process and helped develop the potential of mining in Arizona.

The Hispanic Influence
Since Arizona was originally the northern frontier of New Spain, the region’s early history was dominated by the Spanish. When the Anglos began to filter into the region, they quickly adopted the Spanish techniques, equipment and law.
During the same period an English corporation, Ray Copper Mines Ltd., began developing their operation north of Tucson. Machinery was updated, and steam tractors were used to freight the ore to Red Rock on the Southern Pacific line. Instead of the 4 percent copper the company expected, they only found 2 percent ore. Disappointed, they sold their interest to the Ray Consolidated Copper Company. In 1910 Louis Cates, who had developed the block caving technique first used at Ray, became manager. Using his technique to increase the ore content, he began mining in 1911.

Bagdad was initially identified in 1880 by John Lawler. Because of its isolated location and low grade, however, ore was not developed. Although the Giroux Syndicate gained rights to the mine in 1906, it was not able to do much. Between 1906 and 1927 a number of companies tried to work the mine with the greatest (yet still unsuccessful) effort being that of the Lewishon interests.

Within a few years, 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 considered ". . . docile, fairly efficient, and used to low pay at home." 3

The European Influence
After the Civil War the make-up of the work force changed dramatically with the arrival of Cornishmen, the "Cousin Jack." These skilled, clannish miners from the deep mines of Cornwall soon set the standard for hardrock miners in the American West. Later, at the turn of the century, other groups would become important elements in many camps. Among them were Slovaks, Croatians, Montenegrins, Italians, and Austrians, all fleeing political unrest in southeastern Europe.

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 interests were profits and dividends to the stockholders, the initial developments made little effort to improve 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. A dual wage system with a different scale for Anglos and Mexicans performing the same work was standard in most camps. Often "Boletas" or company script was used to pay workers. Because of their isolated location, most camps were run by the company, which provided housing, food and recreation.

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; "Barrio Mexicano," "Sonora," "Little Italy," "Tintown," or more commonly, "Mexican Camp." 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 rich mosaic. Major holidays such as the 4th of July or Cinco de Mayo provided the entire camp with festivities including sports or demonstrations of mining skills, especially baseball or

A typical group of underground miners in the 1880's. Note the absence of protective gear and the poor lighting. The normal work day for such miners was 10 to 12 hours, six days a week.

Photo Courtesy Sharlott Hall Museum Library/Archives. Prescott, Arizona
In 1927 the Bagdad Copper Company began operation. The beginning of the Great Depression in 1929, slowed but did not stop their efforts. The company managed to continue development through the 1930's and, in 1941 received a government loan that enabled them to add new equipment. Since the low grade ore made underground mining unprofitable, 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. All underground mining at Bagdad had ended by 1950.

These developments made mining the leading industry in Arizona and Arizona the leading copper producer in the United States. As Arizona approached statehood, gained in 1912, nine mining companies dominated the industry, employing nearly two-thirds of all wage earners in Arizona's copper business. More indicative of the industry's importance was the fact that, according to the 1910 census, mining employed 18,094 workers, nearly 25 percent of the wage earners in Arizona. Arizona still produces approximately 60 to 65 percent of the copper produced in this country.

drilling contests. At the same time the work force was fluid, especially among Anglo-Americans. The "ten-day" miner was also becoming a common element.

Social Conditions
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.

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. Company towns of the period are excellent examples of well designed and regulated mining communities. 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 a town developed to support the welfare of employees.
The Labor Movement
Any account of the evolution of mining in Arizona would be incomplete without including the contribution of organized labor unions. The first Arizona mining attempt to organize or join a national labor organization occurred in Tombstone in 1884. When the Grand Central and Toughnut mines announced a pay cut from $4 to $3 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. As a result, 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 then began hiring Mexicans to replace Anglo miners. The miners waged a strike, joining 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 hours the standard for underground 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.

The struggle between mining companies and organized labor became more aggressive in 1905 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 during World War I, were marked by bitter conflict. Deportation of I.W.W. members from Jerome and Bisbee in 1917 virtually ended the union’s effectiveness in the state.

Modern Mining
Since the 1950s relations between mining companies and organized labor have improved. Possibly the best example of this changed relationship is the cooperative agreement that currently exists between Magma (now BHP Copper) and its workers. Additionally, Phelps Dodge is now changing many of its non-union hourly workers to salaried status, thus creating more flexibility, improving benefits, reducing levels of supervision and empowering employees. This new “team” concept of working is creating a more productive, unified workforce.
Today, copper mining is still one of the big “C’s” in the economy of Arizona, along with cotton and cattle. Arizona companies lead the United States in copper production, with approximately 65 percent 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 techniques, the mining industry of Arizona continues to be a significant contributor to the state's economy.

**ADDITIONAL RESOURCES**
- Suggested Reading
- Glossary of Selected Names and Places

*This publication is dedicated to the courageous and committed prospectors and miners from all cultures who helped to shape mining in Arizona.*

**END NOTES**

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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 Sweatheart is a mule in the mine."

*Photo Courtesy Bisbee Mining & Historical Museum*

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, which today 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.