Helvetia-Rosemont
Arizona's Hardscrabble Mining Camp

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Santa Cruz Valley as seen from Gunsight Pass; Helvetia town site resides in the center of the photo with the Sierrita Mountains on the horizon (Zsolt Rosta, February 2007).

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Prologue

Mining played an important role in the settlement of the Arizona Territory and the development of its natural resources. Nearly 6.1% of the population of the Arizona Territory was employed as miners in 1900, representing nearly 14% of its total workforce (Twelfth Decennial Census, 1900). Additional employment opportunities were provided by businesses supplying goods and services to the numerous mining camps scattered throughout the Territory.

Mining and businesses that support mining continue to provide Arizonans an opportunity build a future for themselves and their families. The total economic impact of Arizona's mining industry during 2017 was $10.2 billion and nearly 36,000 direct and indirect jobs (Arizona Mining Association, 2018). Mining continues to be as important today as it was in the past. It is difficult to identify a single item we use every day that does not contain raw materials extracted from the earth (Briggs, 2019).

Life in Arizona's remote mining camps at the turn of the 20th century was not without its difficulties. Many early mining ventures faced obstacles that made job security for residents in these boom-and-bust communities uncertain. Confronted by similar challenges as their predecessors, today's mining projects must also undergo extensive public review and satisfy numerous regulations before production can proceed. In spite of these challenges, both individual miners and those who invest the capital required to explore and develop Arizona's mineral resources have persevered, knowing the minerals they produce are essential for America's economic and national security.

The story of the Helvetia-Rosemont Mining District is one of meeting challenges to provide a better life through persistence and hard work (Figure 1). The pre-World War II history of the district highlights the miners and their families, the early mining communities where they lived, and mining ventures that developed and produced copper from the district's early mines. Post-World War II mining activities involve operations at the Santa Rita marble quarry and efforts to develop the Rosemont copper deposit.

Early History of Southern Arizona (1690-1870)

The roots of mining in Arizona can be traced to Native Americans, who mined surface outcrops for salt, clay, pigments, quartz, stone, turquoise and other materials to produce pottery, tools and weapons (Greeley, 1987). However, no direct evidence of mining by Native Americans has been observed in the area that would become the Helvetia-Rosemont Mining District (Buckles, personal communication, 2020).

Jesuit missionaries led by Father Eusebio Francisco Kino arrived in southern Arizona during the early 1690s and established missions along the Santa Cruz River at Guevavi and Tumacácori in 1691 and San Xavier del Bac in 1692 (Figure 2).

Military garrisons, known as presidios, were established at Tubac in 1750 and in Tucson in 1775 to protect these early settlements (Figure 3).

These communities served as bases for early prospectors, who ventured into the surrounding mountain ranges bordering the Santa Cruz River, its tributary, Sonoita Creek and the areas flanking Arivaca Creek (Greeley, 1987).

Sporadic conflicts between Native Americans and settlers along with other frontier difficulties hampered the early development of mineral resources in southern Arizona. Locations of some of the mines worked prior to 1870 are shown in Figure 3. The earliest prospectors focused on developing rich, near-surface ore bodies, which were quickly depleted. Additional challenges included the lack of an experienced labor force and inadequate ore-processing facilities (Buckles, 2013). In spite of this, small-scale mining activities persisted until the beginning of the Mexican Revolution in 1810.

The withdrawal of Spanish troops during the Mexican War of Independence (1810-1821) led to increased Indian conflicts and outlaw raids, resulting in a gradual abandonment of mining camps, settlements and missions by 1830.

Following the Mexican-American War (1846-1848), Mexico was forced to cede much of its northern territory to the United States under the terms of the Treaty of Guadalupe Hidalgo (Greeley, 1987).

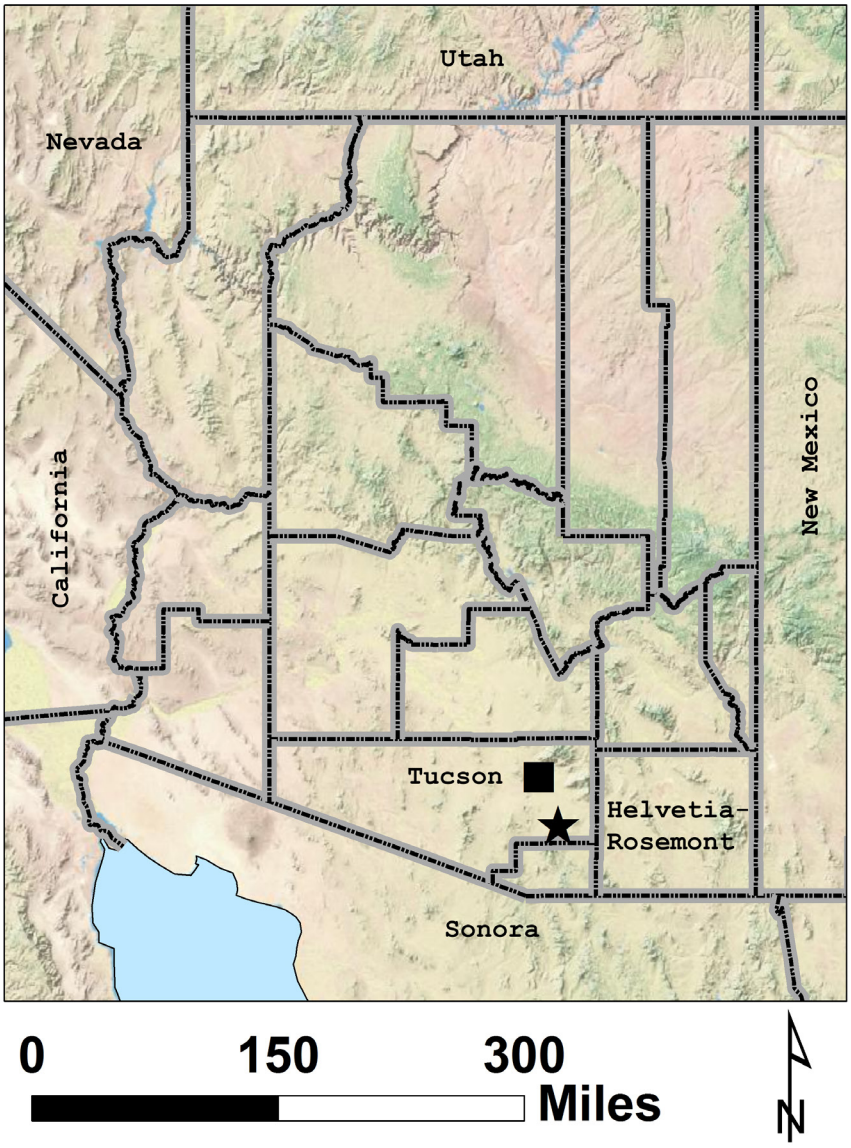


Figure 1. The Helvetia-Rosemont Mining District is located in the northern portion of the Santa Rita Mountains, approximately 30 miles southeast of Tucson, in Pima County, Arizona.

Figure 2. San Xavier del Bac Mission is located on the west bank of the Santa Cruz River, approximately 8 miles south of Tucson, Arizona (Photo by David Briggs, December 2013).

This concession included all of Arizona located north of the Gila River. The remainder of Arizona was acquired by the United States with the ratification of the Gadsden Purchase in June 1854.

United States of America troops arrived in southern Arizona in November 1856. They initially set up a temporary camp, known as Camp Moore, at the site of the old Calabasas Ranch on the Santa Cruz River, located approximately ten miles north of the present U. S.-Mexican border (Sacks, 1965). In June 1857, this military post was relocated to the headwaters of Sonoita Creek, where it was known as Fort Buchanan (Figure 4).

Protection of the civilian population provided by Fort Buchanan allowed limited mining activities to resume in the southern portion of the Santa Rita Mountains and the Patagonia Mountains. American prospectors found old adobe smelters, slag dumps and other evidence of previous mining activity by their Spanish and Mexican predecessors at many sites throughout southern Arizona (Greeley, 1987).

During the late 1850s, tensions between the Apaches and American settlers gradually escalated until February 1861, when an inexperienced army officer falsely accused Cochise, Chief of the Chiricahua Apaches, of kidnapping a rancher's son and stealing cattle. This confrontation led to the deaths of several of Cochise's relatives, igniting a 25-year war between the United States and the Apaches (Thrapp, 1967). The vacuum created by the transfer of federal troops east at the beginning of the American Civil War in April 1861 only made conditions worse, resulting in the abandonment of many remote mining camps and ranches throughout the region.

Following the temporary cessation of hostilities with the Apaches during the fall of 1872, limited mining and ranching activities resumed in parts of southern Arizona. With the closure of the Chiricahua Indian Reservation in October 1876, hostilities resumed making life in southern Arizona's remote mining and ranching communities difficult until Geronimo's surrender in September 1886.

Little is known about early mining activities in the northern Santa Rita Mountains prior to the 1870s. Valued at only a few pennies per pound, copper at Helvetia-Rosemont offered little incentive for most early prospectors, who were searching for gold and silver that could be easily extracted with little effort or expense. Few had the knowledge, skills, or resources required to successfully develop the copper deposits located at Helvetia-Rosemont.

Post Civil War Developments that Impacted Arizona's Copper Industry

The period from the end of the American Civil War until World War I (1865-1914) was a time of rapid industrial growth (Mohajan, 2020). Improvements in manufacturing and production technologies facilitated widespread growth of telegraph and railroad networks, gas and water supplies, and sewage systems, previously restricted to only a few larger cities. At the same time, telecommunication networks and electrical power grids markedly improved the lives of millions of Americans (Figure 5).

Annual U. S. copper production rose from 40 million pounds in 1875 to nearly 1.4 billion pounds in 1915 (Figure 6). Much of this meteoric growth has been attributed to the increased demand for copper that was essential for growing telecommunication networks (telegraph and telephone) and electric power grids developed during this period.

The use of copper in electrical wire for these applications was made possible in 1877, when Thomas Doolittle, a Connecticut brass mill man, developed a process to produce hard-drawn copper wire that was strong enough to be strung overhead. Prior to that time, galvanized iron wire had been used by the telegraph system (Coe, 1995).

In response to the rising demand for copper, innovative mining practices and new technologies were developed or adapted to increase output and profitability of U. S. producers. Examples include the introduction of water-jacketed blast furnaces during the late 1870's, the first commercial U. S. electrolytic refinery at Newark, New Jersey in 1883, and adaption of the Bessemer process to copper smelting at Butte, Montana in 1884 (Hyde, 1998). Large-scale mining of low-grade sulfide porphyry copper ores by open pit and underground (block-caving) methods began at Bingham Canyon, Utah in 1906 and 1909, respectively (Krahulec, 1997).

More than 89% of America's copper production in 1875 came from mines in the Upper Peninsula of

Michigan, which had supplied most of the nation's copper since 1847. As the western states were settled and became accessible to eastern markets following the American Civil War, major copper discoveries in Arizona, Montana, Utah, Nevada and New Mexico were gradually developed to meet the nation's growing demand for the red metal. Montana became the America's largest copper producer in 1887 and was surpassed by Arizona in 1907 (Butler, 1917).

Transportation Infrastructure

Transportation infrastructure was essential to the settlement and development of mineral resources throughout the West; allowing the transfer of goods to and from eastern markets. Important rail lines and wagon roads that served the Helvetia-Rosemont Mining District from 1880 until World War I are shown in Figure 7.

A network of primitive wagon roads provided remote western outposts a tenuous link with the outside world (Figure 8). The vast open spaces were eventually tamed with the completion of the transcontinental railroads and subsidiary branch lines that served many communities throughout the West.

The Southern Pacific Railroad arrived in Tucson from the west in March 1880 and was linked with the Atchison, Topeka & Santa Fe Railroad at Deming, New Mexico in March 1881, completing America's second transcontinental railroad (Janus Associates, Inc., 1989).

Completed in October 1882, the New Mexico and Arizona Railroad ran from Benson south to Fairbank then southwest to Nogales, where it connected with the Sonora Mexico Railroad, which continued south to the port of Guaymas, Mexico (Myrick, 1967).

The arrival of these railroads spurred ranching, mining and other commercial activities throughout southeastern Arizona during the 1880s.

Helvetia-Rosemont Mining District (1875-1961)

The northwest elongated Helvetia-Rosemont Mining District (~ 9 miles by 2 miles) straddles the Santa Rita Mountains (Figure 9). The portion of the district located along the western flank of the range is known as the Helvetia Sub-district, while the portion along its eastern flank is known as the Rosemont Sub-district.

The communities of Helvetia (1899-1923), Tip Top (1903-1907), Old Rosemont (1894-1910) and New Rosemont (1915-1921) served the burgeoning mining industry.

The Helvetia-Rosemont Mining District was established on April 16, 1878, by Ben Hefti and several other prospectors, all of whom held mining claims along the western flank of the Santa Rita Mountains. Hefti, a well-known and respected miner in southern Arizona, named the western site Helvetia after the female national personification of Switzerland, his native homeland (Buckles, 2013).

The VR Ranch, now known as Rosemont Camp, was founded by Edward Vail in 1883 (Figure 10). Edward was the younger brother of Walter Vail, who purchased the Empire Ranch homestead in August 1876 (Schaefer, 1979).

The Scholefield Ranch, now known as the Hidden Valley Ranch, was founded by George P. Scholefield in 1884 (Schaefer, 1979).

Helvetia Sub-district – The Early Years (1875-1890)

The first copper ore from the Helvetia-Rosemont Mining District was mined at the Omega Mine (Figure 11). During the summer of 1875, Pinckney Tully and Estevan Ochoa transported 5,000 pounds of hand-sorted, high-grade copper ore from the Omega claim to the corral of their Tucson-based freighting business located at the corner of Ochoa and Stone, where it was treated by two small blast furnaces (Rickard, 1987).

This early business venture and the news that Southern Pacific Railroad was headed for Tucson intensified interest in the copper resources of the northern Santa Rita Mountains. Prospectors flocked to the area, eventually establishing the Helvetia-Rosemont Mining District in April 1878. L. M. Grover discovered rich copper ores at the Old Dick, Heavyweight and Tally Ho claims in 1880. During the early 1880s, the Mohawk and Little Dave (i. e., Isle Royal mine) claims were staked by John Weigle and C. E. Hughes, respectively (Schrader, 1915). By 1883,

twenty mining claims were recorded in the Helvetia area (Feil, 1968).

Much of the early mining activity in the Helvetia Sub-district was conducted by lone prospectors, who struggled to work their claims without the assistance of outside capital. However, it was soon realized that financial investment was essential for the development of the mining, transportation and supporting infrastructure required to make the copper resources at Helvetia a commercially viable enterprise (Buckles, 2013).

The Bulldozer Mine (also known as Bull Docer Mine) was one of the early mining operations at Helvetia that was financially supported by eastern capital (Figure 12). Incorporated in 1881, the Columbia Mining and Smelting Company commissioned a 30-ton per day blast furnace at the Bulldozer Mine, which produced 30,000 pounds of copper bullion in August 1882. This copper bullion was transported by wagon to the railhead at Tucson for shipment to a New York refinery (Buckles, 2013).

The Omega Mine was the other early mining operation at Helvetia that benefited from eastern capital (Figure 13). Also incorporated in 1881, the Omega Copper Company commissioned a small, water-jacketed blast furnace manufactured by the Pacific Iron Works of San Francisco at the site in April 1883. This early operation is reported to have had 70 workers in 1883 (Buckles, 2013).

The Omega Copper Company was organized by four prominent Arizona pioneers (Figure 14), Pinckney R. Tully, Estevan Ochoa, Fred G. Hughes, and Thomas J. Jeffords (Feil, 1968).

Pinckney Tully and Estevan Ochoa were partners in Tully, Ochoa and Company, a freight and mercantile firm formed in 1863. Originally located in Tubac, its headquarters was relocated to Tucson in 1868. By the 1870s, it was the largest freighting business in the Arizona Territory. Unable to compete with the railroad, Tully, Ochoa and Company went bankrupt in 1884 (Walker, 1973).

Pinckney Tully served as Arizona Territorial Treasurer from 1873 until 1877, the mayor of Tucson in 1882, and founded the Pima County Bank during the early 1880s.

Estevan Ochoa was Pima County's representative to the 5th, 6th and 9th Arizona Territorial Legislative Assemblies during 1868, 1871 and 1877, respectively. He also served as mayor of Tucson in 1875.

Fred Hughes was a miner, gambler and politician, who served as Pima County's Representative to the 9th, 10th, 12th, 16th and 19th Arizona Territorial Legislative Assemblies between 1877 and 1897. He also served as President of the Arizona Territorial Senate on several occasions.

While serving as President of the Arizona Pioneers' Historical Society, Hughes was charged with embezzling $2,000 from the society to pay gambling debts. Pleading guilty in March 1898, he served time in the Yuma Territorial Prison until he was paroled in December 1900. He died in Greaterville, Arizona in September 1911 after being struck by a bolt of lightning (McClintock, 1916a).

Thomas Jeffords was a U. S. Army Scout, Indian agent, and prospector. Known as “Red Beard” to his good friend Cochise, he helped negotiate a peace treaty between General Howard and Apaches in October 1872, which resulted in the formation of the Chiricahua Indian Reservation, where Jeffords served as Indian Agent until June 1876 (Thrapp, 1988).

Early mining activities at the Bulldozer and Omega mines were short-lived projects. Already handicapped by poor management, declining copper prices made these early business ventures unprofitable, forcing their eastern stockholders and Tucson creditors to cut their losses.

The Columbia Mining and Smelting Company’s Bulldozer Mine was the first to close in April, 1883. Unable to pay an outstanding debt of $4,000 to Zeckendorf’s Tucson store, its smelter, buildings, and equipment were sold at public auction by the Pima County Sherriff (Buckles, 2013).

Omega Copper’s mine ceased operations in August 1883 as a result of on-going litigation by the company’s Philadelphia stockholders, who were worried about falling copper prices and the poor management of the operation (Buckles, 2013).

Fluctuating copper prices became the most important factor in determining the economic viability of mining operations in the Helvetia-Rosemont Mining District.

Early Patented Mining Claims (1882-1886)

Figure 15 shows the 132 mining claims that were patented in the Helvetia-Rosemont Mining District between 1882 and 1995. Of these, two mining claims were patented by the Omega Copper Company in October 1882; the Eclipse Copper claim was patented by M. L. Gerould in June 1884; and the Bulldozer claim was patented by Robert Paul in September 1886.

Helvetia Copper Company (1890-1918)

Mining remained largely inactive until the early 1890s, when the increasing demand for copper wire spurred by the electrical revolution resulted in the influx of outside capital required to develop the copper resources at Helvetia.

A group of investors led by William A. Paine, a co-founder of the Boston-based brokerage firm, Paine Weber & Company, began acquiring mining claims at Helvetia during the early 1890s (Figure 16).

William Paine's most notable success was the Copper Range Consolidated Company, a securities holding corporation that controlled a number of major copper mines in the Upper Peninsula of Michigan during the early 1900s (Lankton, 2010).

Over a period of several years, Helvetia's on-site workforce gradually expanded as their holdings were methodically evaluated by excavating exploratory shafts, cuts, and shallow pits. This work confirmed the presence of rich, near-surface, oxidized ores, assaying between 10 to 24% copper, which were underlain by a low-grade sulfide resource, containing less than 5% copper (Buckles, 2013).

It was during this early period the Helvetia mining camp first began to take shape. By March 1898, William Paine had acquired 27 mining claims in the Helvetia Sub-district at a cost of $50,000 (approximately $1.5 million in 2020 dollars) (Buckles, 2013).

Encouraged by exploration results, the Helvetia Copper Company was incorporated in March 1899 under the laws of New Jersey to manage its day-to-day mining operations. It was capitalized at $5 million, with 150,000 shares issued at $25 per share (Stevens, 1904). Active mines in Helvetia Sub-district from 1890-1923 are shown in Figure 17.

Under the direction of James B. Seager, general manager, Helvetia Copper's workforce grew from 55 to 350 workers over the next 9 months as approximately $800,000 (approximately $25 million in 2020 dollars) was invested in the town site, smelter, warehouse, assay lab, a narrow gauge railroad, and mine development (Schrader, 1915).

By the spring of 1899 a 17-mile wagon road connecting Helvetia with the Southern Pacific railhead at Vail Station had been completed. The wagon road connecting Helvetia with Tucson was badly in need of repair. Fearing loss of business, the Pima County Board of Supervisors promptly acted to see that the necessary repairs were made. Stage coach service was also established, connecting Helvetia with Tucson and Vail (Feil, 1968).

As with other early mining booms, merchants were the ones who struck it rich, and Helvetia was no exception to this rule. Several merchants abandoned prosperous businesses in Tucson to concentrate their efforts on opportunities in Helvetia. Others ventured from nearby mining camps, drawn by the lure of Helvetia's thriving economy. Adolfo Verdugo and Bartolo Barcelo, who operated the general store at Old Rosemont, opened a second store at Helvetia that reportedly grossed $10,000 per month (equivalent to $300,000 per month in 2020 dollars). Nearby ranches supplied meat and other products to the mining community. Small children helped to supplement their family's income by selling firewood and drinking water gathered from the surrounding hills (Feil, 1968).

Both residents and visitors enjoyed the fine cuisine at Dorsett's Helvetia House, a boarding house and restaurant. Social life revolved about several saloons that provided alcohol, a place to gamble and other entertainment. Initially little more than a tent covering a wooden frame, these temporary structures were eventually replaced by frame and adobe buildings. The saloons were a constant source of disturbance in the community. Inebriated employees cost the Helvetia Copper Company almost $1,000 per month and led to the dismissal of many workers (Feil, 1968).

The establishment of a post office and school district at Helvetia in January 1900 gave this community an added degree of stability.

By mid-April 1899, several carloads of mining equipment had arrived at Vail Station as construction crews readied the Helvetia site. Following the completion of the wagon road during the spring of 1899, this machinery was hauled by mule-drawn wagons to Helvetia. Upon its arrival in Helvetia, work began on the smelter and other mining infrastructure was rapidly readied for operation (Feil, 1968).

By October 1899, the Helvetia Copper Company had completed its warehouse and work had begun on the narrow-gauge railroad, which would transport ores from distant mines to the smelter. The first copper ores were delivered to ore bins at the smelter in late November 1899 (Figure 18). The 200-ton per day smelter was commissioned in late December 1899, producing copper bullion at rate of 400 pounds an hour (Buckles, 2013).

Ores from the Heavyweight, Copper World, Leader, and Isle Royal mines were transported to the smelter via a 14,500-foot narrow-gauge railroad. A 10-ton Saddle Tank Porter locomotive (shown in Figure 19) and an 18-ton Shea locomotive were employed to perform this task (Irvin, 1987). One of Arizona's few "island railroads," Helvetia Copper's railroad was built many miles from another railroad (Myrick, 1967).

Although several rich discoveries were made during early 1900 and the smelter operated at full capacity, this early operation faced several challenges. Smelting of the copper ores was temporarily halted on several occasions during the summer of 1900 due to inadequate water supplies to run the steam engines and cool the smelter jacket. This was resolved in September 1900, when water was encountered at a depth of 300 feet in the Isle Royal shaft (Buckles, 2013).

A second impediment to the Helvetia Copper's operation was its inability to secure a reliable source of coke to fuel the smelter. Coke is a gray, hard, and porous fuel with high carbon content and few impurities. It is produced by heating bituminous coal in the absence of air to drive off volatile constituents. Burning hotter and cleaner than coal, coke was essential for the efficient operation of blast furnaces of the period. Intermittent shortages of coke, which had to be hauled by wagon from the Vail railhead, slowed production and resulted in sporadic periods of unemployment for Helvetia Copper's workforce throughout much of its life (Buckles, 2013).

Helvetia Copper's smelter was completely destroyed by fire after molten slag ignited its wooden floor on December 6, 1900, resulting in estimated damages of $100,000. However, the impact on the community was more severe. Fifty percent of Helvetia Copper's workforce was laid off, putting more than 250 laborers out of work and halting production until a new smelter resumed operations at the site in May 1901 (Feil, 1968).

Helvetia Copper pursued a policy of dismissing single men first, which enabled the community to survive this setback. Work on replacing the smelter began immediately and life at Helvetia went on at a normal pace with the hope that losses could be recouped once commercial operations resumed (Feil, 1968).

Although the new smelter was successfully commissioned, losses that had been incurred from the smelter fire, six months of lost production, and their inability to obtain a reliable source of coke to fuel the smelter proved too much for Helvetia Copper. When the copper price collapsed from 17 to 11 cents per pound in late January 1902, all operations were suspended. This resulted in a major exodus from the district as workers left to find employment elsewhere, leaving only 100 residents in the camp. Company assets were packed up and taken to Tucson, where they were sold at auction in July 1902. James Seager closed Helvetia Copper's Tucson office in June 1903 and moved back to Michigan (Buckles, 2013).

In November 1903, the assets of the Helvetia Copper Company were purchased by the Michigan and Arizona Development Company, which was headquartered in Minneapolis, Minnesota (Schrader, 1915). Organized under the laws of Arizona with a total capitalization of $200,000, this new company included Boston and Michigan stockholders of the defunct Helvetia Copper Company and officers of the Pillsbury-Washburn flour mills in Minneapolis (Buckles, 2013).

Under the leadership of F. B. Close, who served as a mining engineer with the former Helvetia Copper Company, a 40-man workforce resumed mine development on the more profitable claims in January 1904. Small shipments of direct smelting ores recommenced in March 1905. Principal producers included the Copper World, Isle Royal and Leader mines (Buckles, 2013).

The Helvetia Copper Company was reorganized as the Helvetia Copper Company of Arizona in October 1905 with capitalization of $5 million. Ninety thousand shares were issued at $25 per share (Stevens, 1908). By late October 1905, the company employed 150 workers, who extended the Isle Royal shaft to a depth of 800 feet and refurbished the existing smelter, which resumed operations in early 1906. Capital improvements included a generator that provided electricity for the smelter and mining camp (Buckles, 2013). However, smelting operations were temporarily halted in May 1906, when its ore bins collapsed as a result of a poor foundation (Stevens, 1908).

Although the refurbished smelter proved a financial failure and was permanently closed in early 1907, direct smelting ores continued to be transported by mule-drawn wagons to the Vail railhead for shipment to the Old Dominion smelter in Globe, Arizona. By late summer 1907, a downturn in the nation's economy forced Helvetia Copper to lay off a portion of its workforce and lower the wages for the remainder. Only 75 workers remained employed in December 1907 (Buckles, 2013).

Over the next several years, Helvetia Copper struggled to improve productivity and lower its operating costs. For a brief period during 1908, the company experimented with a 30-ton, Medbery oil-fired reverberatory furnace that ultimately proved unsuccessful (Stevens, 1908). Gasoline-powered caterpillar tractors were employed to transport the ore wagons to the Vail railhead during the spring of 1909. However, this alternative soon proved unfeasible, forcing the Helvetia Copper to revert to the old method of mule-drawn ore wagons (Buckles, 2013).

In an effort to cut its losses, Helvetia Copper reduced its workforce during 1910 and finally suspended all operations in April 1911, due to high production costs and falling copper prices. Water pumps were subsequently removed and the mines allowed to flood. Most of the salvageable equipment was sold at auction by early 1912 (Buckles, 2013).

In twelve years, the once thriving community of Helvetia became a shadow of itself as businesses closed and miners drifted away. A few hardy souls remained, hoping mining would resume. Others found work at neighboring ranches.

An increased demand for copper during World War I resulted in a brief revival at Helvetia, swelling its population to 100. The Copper World and Leader mines produced approximately 5,400 tons of ore before closing in 1918, marking the end of this once prosperous community. Helvetia's post office ceased operations in December 1921 and its public school closed in 1923. By 1930, less than 10 residents remained at Helvetia (Buckles, 2013).

Other Mining Companies at Helvetia (1894-1960)

Other mining companies that intermittently operated in the Helvetia Sub-district during the late 1890s and early 1900s included the Rosemont Copper Company, Tip Top Copper Company, and the Omega Copper Company (Figure 20) (Feil, 1968).

Rosemont Copper Company (1894-1900)

High-grade copper ore from the Mohawk Mine was transported by mule over the crest of the Santa Rita Mountains and custom smelted at the Old Rosemont smelter from October 1894 until July 1895 (Schaefer, 1979). John Weigle sold the Mohawk Mine to the Lewisohn Brothers in December 1896 (Ayres, 1984). Rosemont Copper Company sank a shallow shaft and developed two small ore bodies from which approximately 3,000 tons of ore was extracted before closing the mine in 1900 (Schrader, 1915).

Tip Top Copper Company (1902-1907)

Organized in 1902 under the laws of Arizona by a group of Philadelphia investors, the Tip Top Copper Company (also known as the Little Helvetia Copper Company) acquired a claim block, located in the northwest portion of the Helvetia Sub-district around February 1903 (Buckles, 2013). By May 1903, they established a small community of Tip Top, located approximately a half mile north of the mine at the junction of the Tucson and Vail wagon roads (Figure 17).

The Tip Top Copper Company achieved production at the Tip Top Mine in March 1904. Over the next several years, they shipped 13,100 tons of ore, averaging approximately 6.5% copper to American Smelting and Refining Company's (ASARCO) smelter in El Paso, Texas. In late December 1906, ASARCO acquired a lease on the Tip Top property, but only produced 300 tons of ore before ceasing operations in November 1907 (Schrader, 1915). The property

was returned to the Tip Top Copper Company, who resumed limited production (1913-14) before transferring ownership to a private individual in 1917 (Ramslo, 1951).

Omega Copper Company (1906-1909)
The Zeckendorf brothers established A. & L. Zeckendorf, Wholesale and Retail in Santa Fe, New Mexico in 1863. This business venture prospered, permitting them to expand their operations to Albuquerque, Deming and finally Tucson in 1868 (Figure 21). Louis Zeckendorf lived in New York, where he bid on and purchased supplies, while Aaron and William ran the stores in Albuquerque and Tucson, respectively. Aaron Zeckendorf died in March 1872 and William resigned from the business in early 1878. In February 1878, Louis Zeckendorf made his nephew, Albert Steinfeld a partner and renamed the business, L. Zeckendorf and Company. By 1889, it was the largest retail and wholesale business in the Arizona Territory (Fierman, 1981).

Like other successful entrepreneurs of the time, Louis Zeckendorf recognized and participated in many lucrative business opportunities in the Arizona Territory (Figure 22). This included speculation in many Arizona mining ventures. During the spring of 1880, he was one of original investors in the Copper Queen Mine in Bisbee (Hyde 1998) and served as the first treasurer of the Copper Queen Mining Company, which was incorporated in April 1881 (Fierman, 1981). Over the years, he also made investments in the Mineral Creek (Ray), Oro Blanco, Silver Bell, and Helvetia-Rosemont mining districts.

Following the closure of the Omega Mine in August 1883, Louis Zeckendorf purchased its assets. He held the property for many years before reorganizing the Omega Copper Company in May 1906 under the laws of Arizona with capitalization of $2.5 million at $10 per share (Stevens, 1908). The Omega Mine resumed production in 1907 and operated until 1909, intermittently shipping a total of approximately 5,600 tons high-grade copper ore to regional smelters.

Other Copper Operations in Helvetia Sub-district
Lessees shipped approximately 9,300 tons of copper ore from Rosemont Copper's Peach and King-Exile properties during World War I. Following the war, copper production declined significantly, being derived from lessees or small miners before almost ceasing entirely during the Great Depression.

Spurred by increased demand and war-time incentives, limited operations resumed at Helvetia during the early 1940s. Production continued until 1960 with high-grade, fluxing ores being shipped to regional smelters. Active producers included the Bulldozer, Elgin (Figure 23), Leader, Mohawk, Old Dick, King-Exile and Tip Top mines.

Early Mining Operations at Helvetia

Early copper production from the Helvetia Sub-district was derived from small surface pits and underground workings accessed by shallow shafts and adits. The Isle Royal and Copper World mines were the deepest underground mines in the Helvetia Sub-district (Schrader, 1915). The Isle Royal Mine was accessed by an 800-foot, two-compartment, vertical shaft (Figure 24). This operation had approximately 4,000 feet of workings on seven levels.

The Copper World Mine was accessed by a 68-degree, 500-foot inclined shaft with 12,000 feet of workings on four levels (Figure 25). Other underground mines in the district extended to depths of less than 300 feet.

During the early 1900s, mining operations at Helvetia employed a 375-horsepower (hp) steam plant, 50-hp gasoline hoist, a 9-drill Ingersoll-Rand air compressor and an electrical light plant. A Prescott Triplex pump was used to dewater the mine workings, as flooding was a problem in the lower levels of the Isle Royal and Copper World mines (Stevens, 1911).

Copper Ores at Helvetia
Averaging 8 to 10% copper with trace amounts of gold and silver, these ores occurred as small irregular zones hosted by altered limestone located adjacent to a granite contact or occurred along fault zones that conducted the mineralizing fluids (Schrader, 1915).

These ores were oxidized to a depth of 100 to 300 feet (Schrader, 1915). The oxide mineral assemblage includes cuprite, malachite, azurite, chalcanthite, and chrysocolla (Figure 26). The underlying sulfide mineral assemblage contains chalcopyrite and bornite with minor amounts of molybdenite (Anzalone, 1995).

Hazards of Underground Mining

Copper mining during the early 1900s was an inherently dangerous occupation that exposed workers to numerous hazards, both above and below ground. Men were injured or died from falling rock, explosions, hoisting mishaps, bad air, fires, and inhaling silica dust.

Miners commonly toiled for long hours in poorly lighted and ventilated underground mine workings, drilling, blasting, mucking and transporting material from the working face to the shaft to be hoisted to the surface.

New technologies designed to improve productivity commonly exposed workers to new hazards. Invented during the 1870s, the pneumatic drill enabled a two-man team to drill a 5- to 6-foot blast hole in a solid rock face in a matter of minutes. Solely operated on compressed air, early pneumatic drills were known as "Widow-makers" because of the dense clouds of dust they generated. It took only a few years of operating this equipment in the poorly ventilated, confined underground workings for a miner to develop silicosis, a debilitating lung disease that made it hard to breath. Around 1902 pneumatic drills were modified to use water to combat the dust problem, but many mining operations throughout the west continued to use the older models for many years, exposing workers to unnecessary health risks (Holman, 1947).

Miners' Compensation

During the period 1899-1909, miner's wages at Helvetia ranged from $3 to $4 per 10-hour day, which is equivalent to $92 to $113 in 2020 dollars. Unskilled labor ranged from $1.25 to $2.00 per day, which is equivalent to $37 to $56 in 2020 dollars. Daily wages for miners at Helvetia were competitive with those received by miners in other Arizona mining camps. However, pay for unskilled labor was significantly less than average (Buckles, 2013).

Racial discrimination and wage disparity even among workers of different ethnicities performing the same job was the norm in Arizona mining camps during the early 1900s. Helvetia was no exception to this practice (Buckles, 2013).

Contractors, who supplied wood to fuel the steam-powered mining equipment, were paid $2.50 to $3.00 per cord. Mine timbers delivered from the higher peaks in the Santa Rita Mountains were supplied at a cost of $0.10 per linear foot (Buckles, 2013). Freighting goods from the Vail railhead (17 miles) cost $3 per ton (Schrader, 1915).

Organized Labor at Helvetia

Widespread labor disputes between workers and management were common from 1890 through 1920 in many mining camps throughout the western United States. Workers' efforts to negotiate a fair wage, safe working conditions, shorter work hours, and the elimination of racial wage disparity was commonly countered by mass layoffs, intimidation, and even deportations (Buckles, 2013).

Miners and management at Helvetia avoided most of the violence associated with the labor movement. Records show only one brief strike by hoisting engineers at Helvetia during 1907. It was peacefully resolved after deputies from Tucson were summoned to control the Mexican miners, when it was feared they would join the striking Anglo hoist operators (Buckles, 2013).

Western Federation of Miners President Edward Boyce (Figure 27) personally organized Helvetia's Western Federation of Miners (WFM) Lodge No. 17 in 1900, demonstrating the district's importance to the labor movement. Boyce and Helvetia lodge president, Al Paff successfully negotiated a fair labor agreement with the management of the Helvetia Copper Company. However, this agreement only pertained to white miners as the Western Federation of Miners did not represent Mexican or other ethnic minorities until 1910 (Buckles, 2013).

Early Smelting Operations at Helvetia

During the early 1900s, high-grade copper ores from Helvetia-Rosemont were either shipped directly to regional smelters or were treated on-site in a water-jacketed blast furnace to produce a copper bullion or matte product.

First developed in Norway in 1852, water-jacketed blast furnaces replaced less efficient adobe-type blast furnaces that had been employed to treat copper ores in Arizona prior to the early 1880s (Rickard, 1987). Water-jacketed blast furnaces consisted of an internal iron shell that was encased by a hollow metal jacket, inside which flowed cool water. Fig. 28 displays a sketch of a water-jacketed blast furnace.

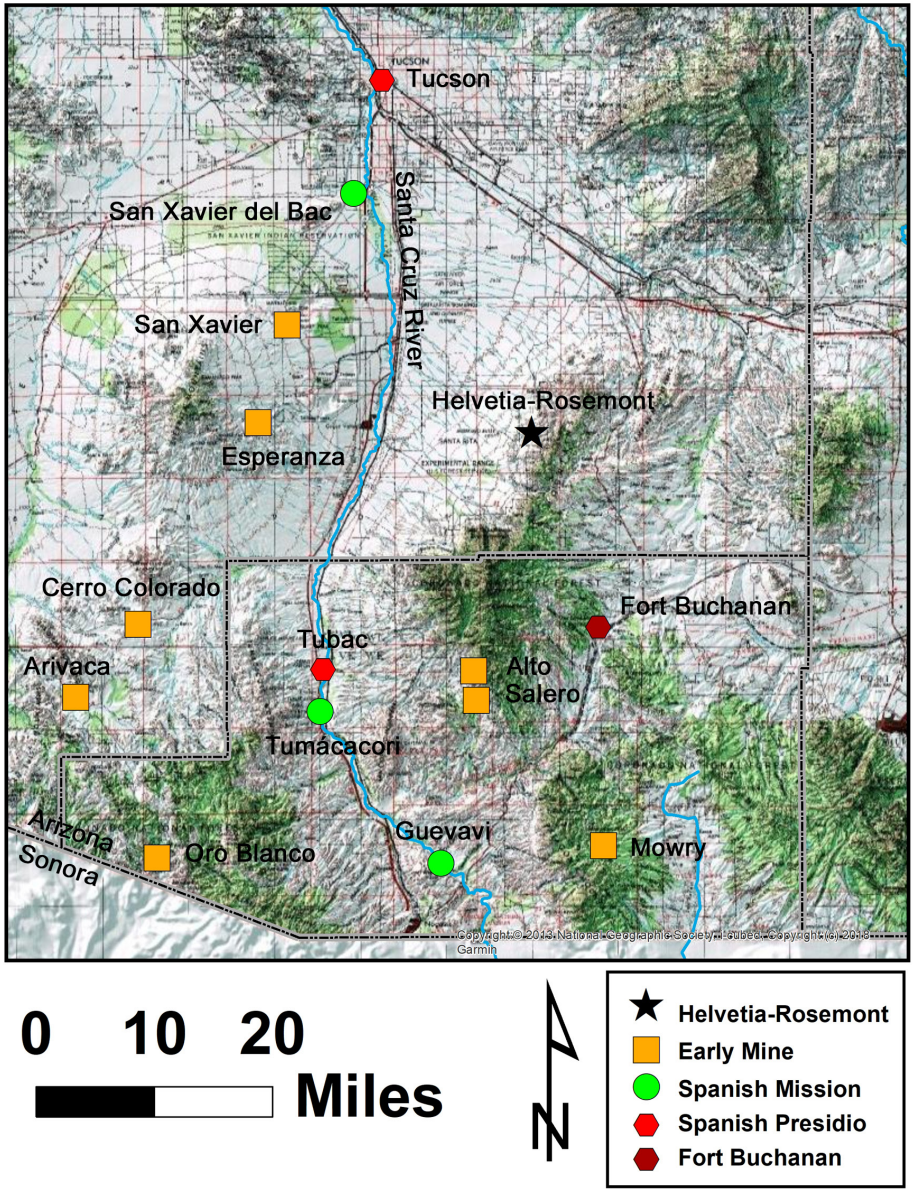


Figure 3. Pre-1870 missions, military posts and mining camps of southern Arizona (Modified from Keith, 1974 and Keith, 1975).

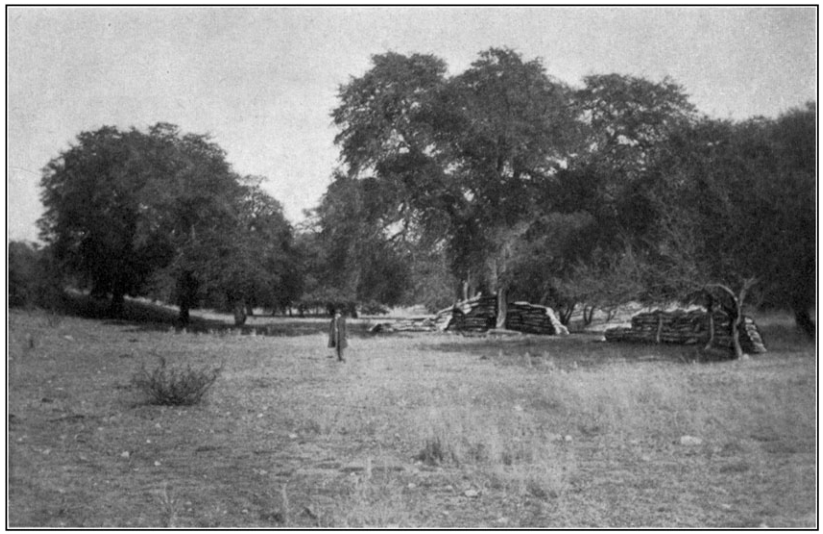


Figure 4. Ruins at Fort Buchanan are located approximately 3 miles southwest of Sonoita, Arizona, circa 1914 (Photo from Cady, 1914).

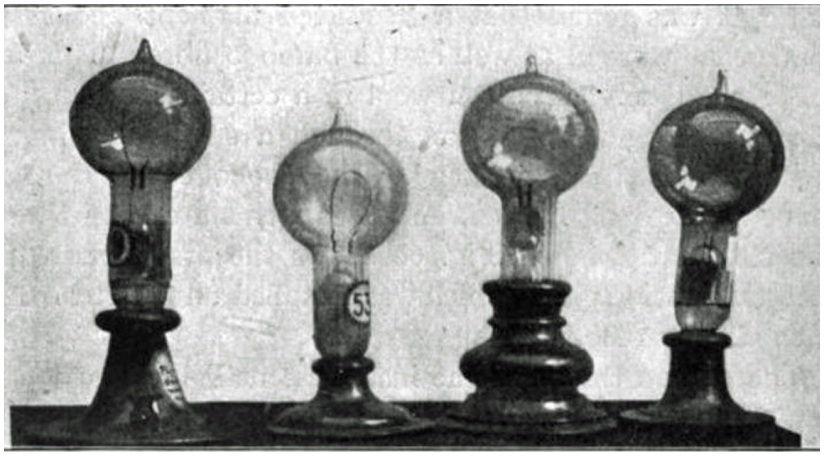


Figure 5. Early incandescent light bulbs were invented by Thomas Edison in 1879 (Photo from Burns, 1910).

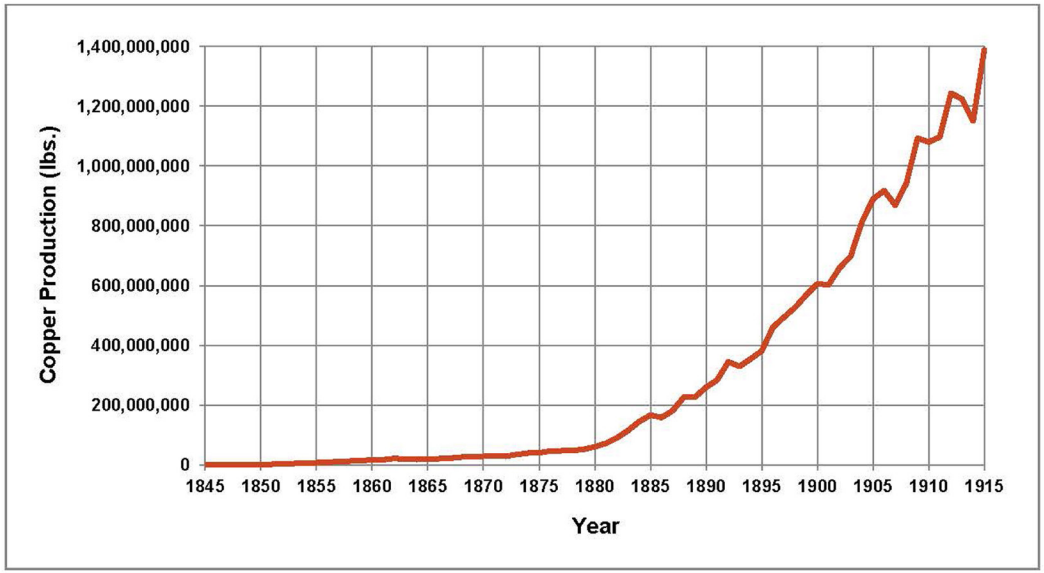


Figure 6. Annual U. S. copper production from 1845-1915 (Data from Butler, 1917).

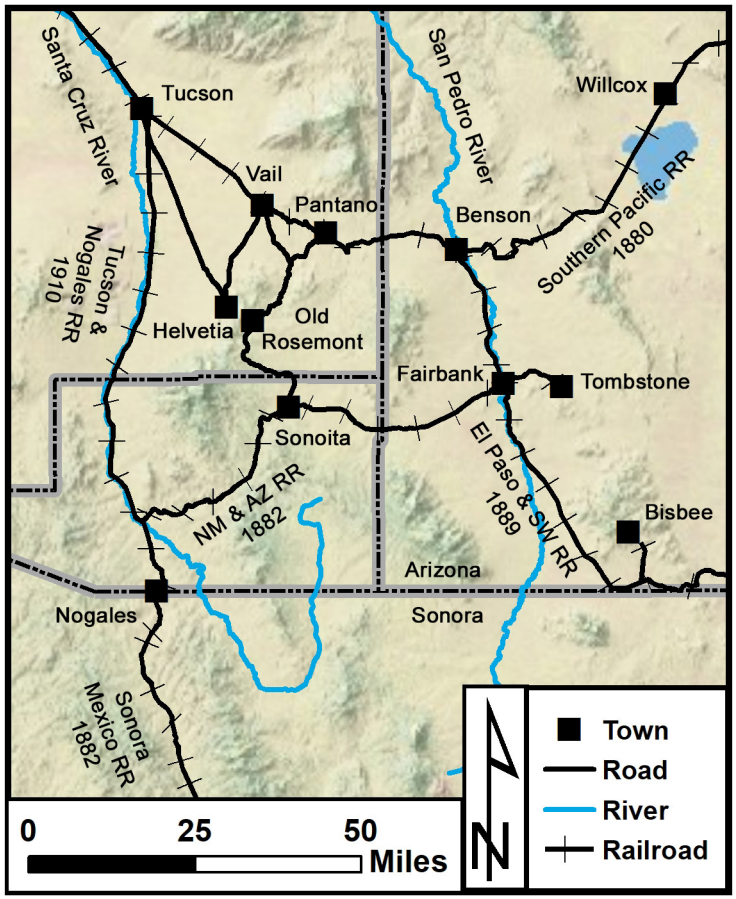


Figure 7. Transportation infrastructure of southeastern Arizona from 1880 until World War I.

Figure 8. Freight wagons in Tucson, Arizona, circa 1880 (Photo from Arizona Daily Star, 2018).

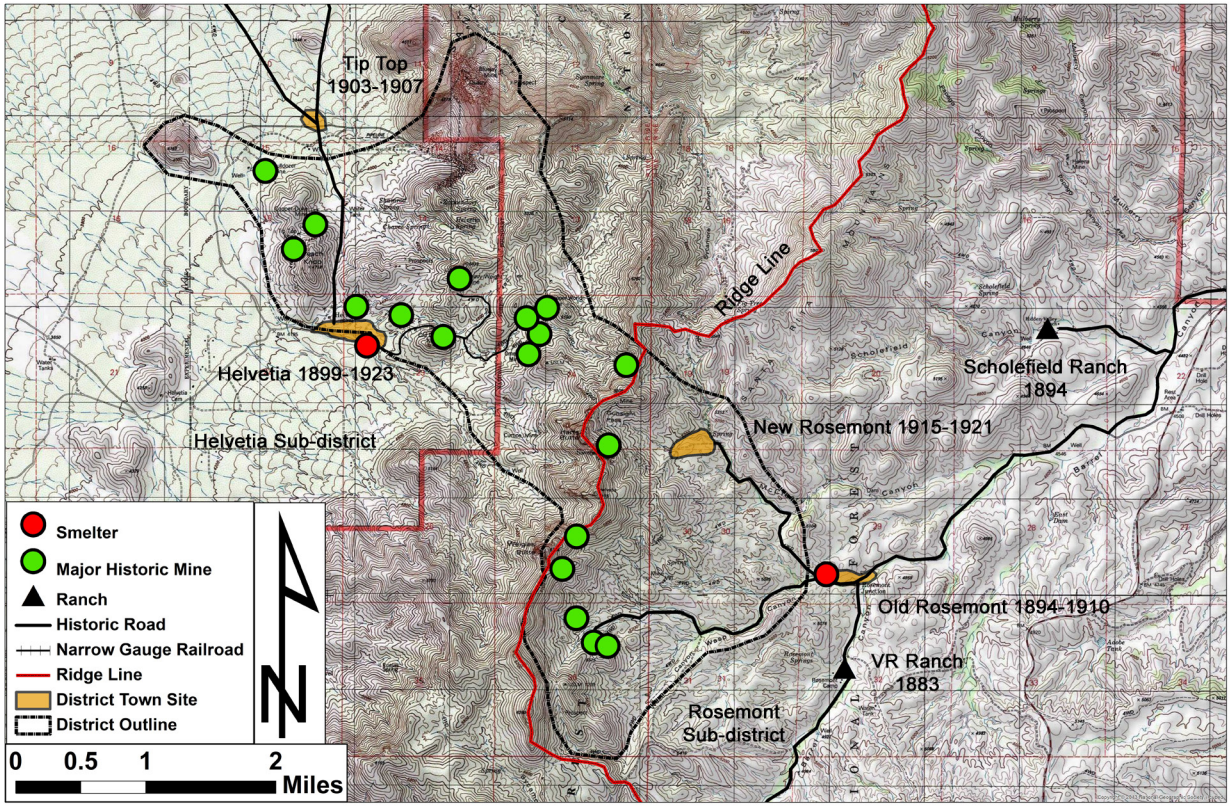


Figure 9. Helvetia-Rosemont Mining District (1875-1923), showing historical mines, town sites, ranches, and roads.

Rosemont Camp

Hidden Valley Ranch

Figure 10. Early ranches located near the Helvetia-Rosemont Mining District (Rosemont Camp photo by David Briggs, November 2009; and Hidden Valley Ranch photo by William Peachey, September 2012).

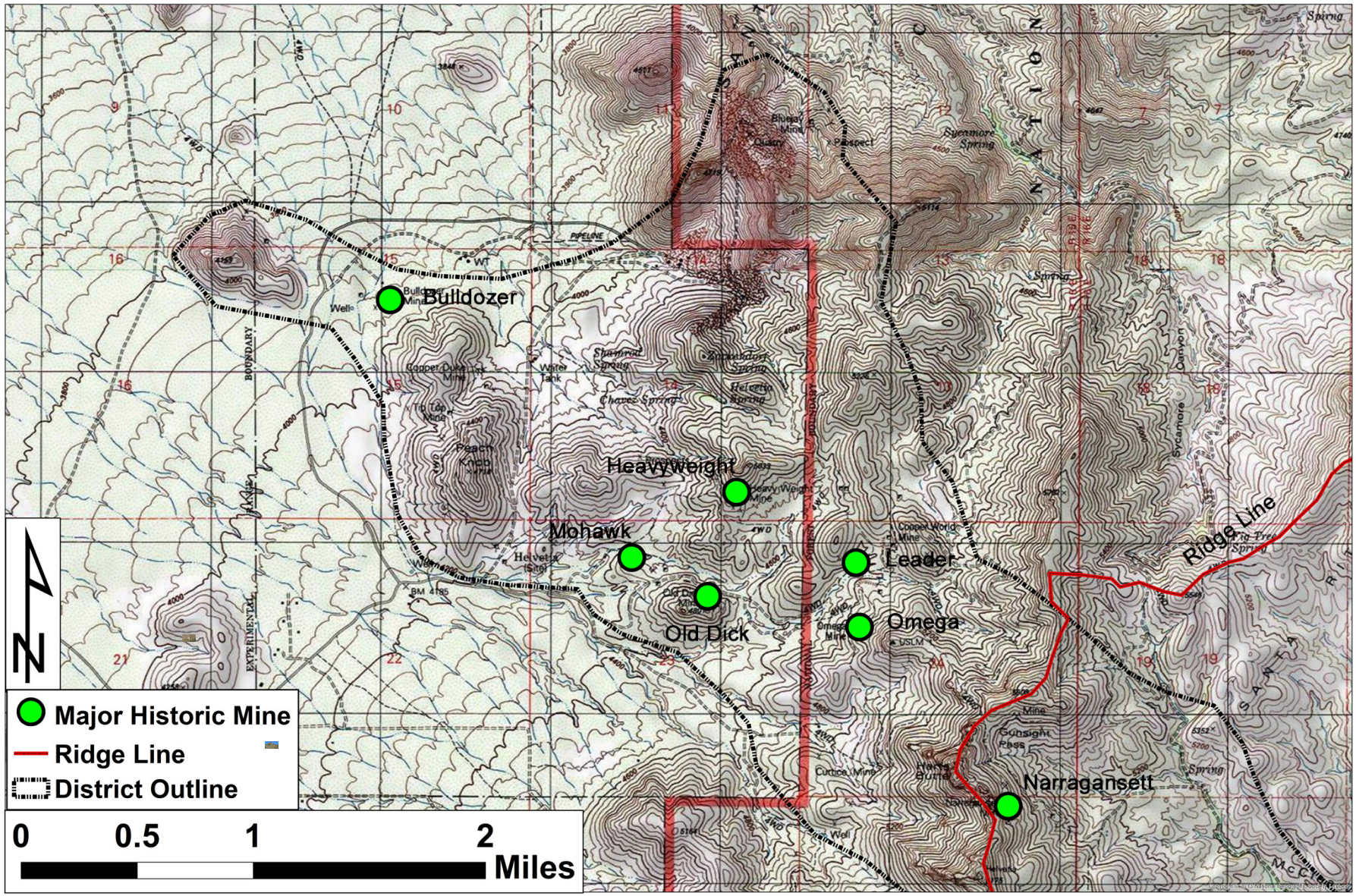
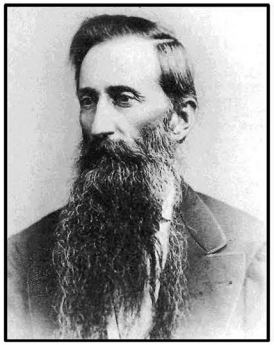


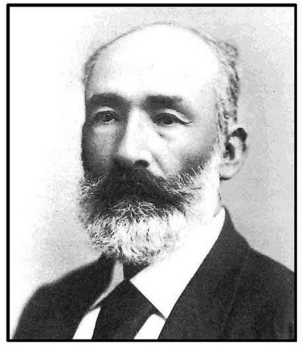
Figure 11. Active mines of the Helvetia Sub-district during 1875-1883.

Figure 12. The Bulldozer Mine was initially operated by the Columbia Mining and Smelting Company during the early 1880s (Photo by David Briggs, December 2013).

Figure 13. Mine dumps (lower left and upper right) of the lower and upper adits at the Omega Mine (Photo by David Briggs, December 2013).

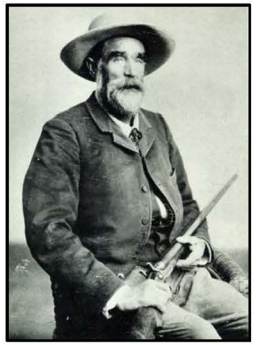


Pinckney R. Tully
(1824-1903)



Estevan Ochoa
(1831-1888)

Fred G. Hughes
(1837-1911)



Thomas J. Jeffords
(1832–1914)

Figure 14. Four prominent Arizona pioneers who organized the Omega Copper Company (Photos - Pinckney Tully and Estevan Ochoa from Arizona Historical Society; Fred Hughes from Anonymous (1897); and Thomas Jeffords from Henry E. Huntington Library, San Marino, California).

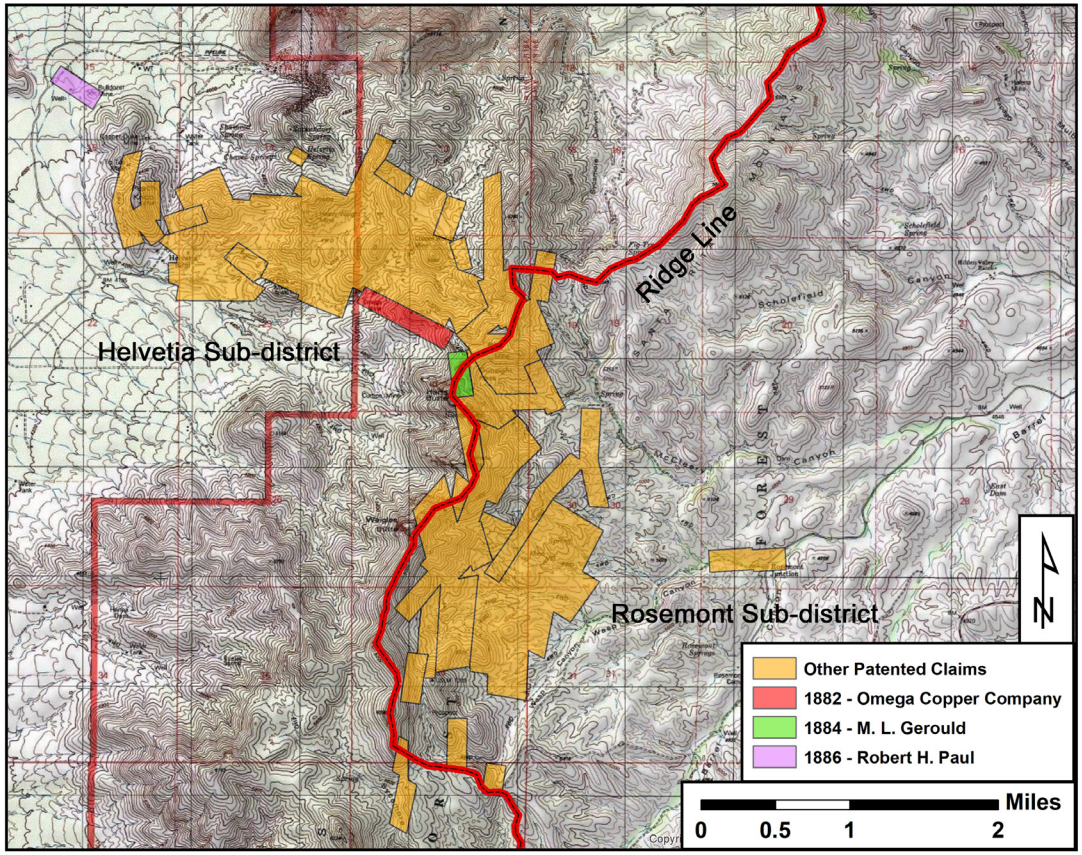


Figure 15. Patented mining claims (1882-1886) in Helvetia-Rosemont Mining District (Prepared from Bureau of Land Management records).

Figure 16. William A. Paine (1855-1929) was one of the principal organizers of the Helvetia Copper Company, circa 1900 (Photo from Wikipedia, 2020).

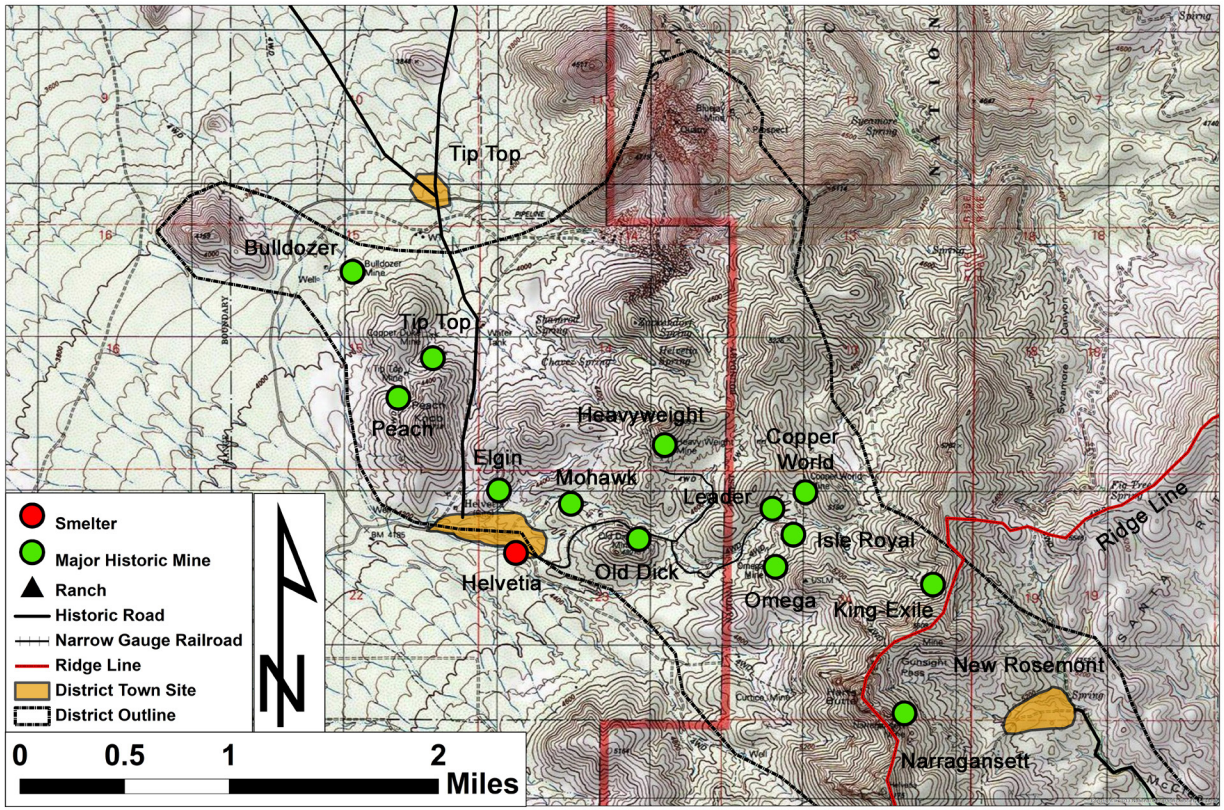
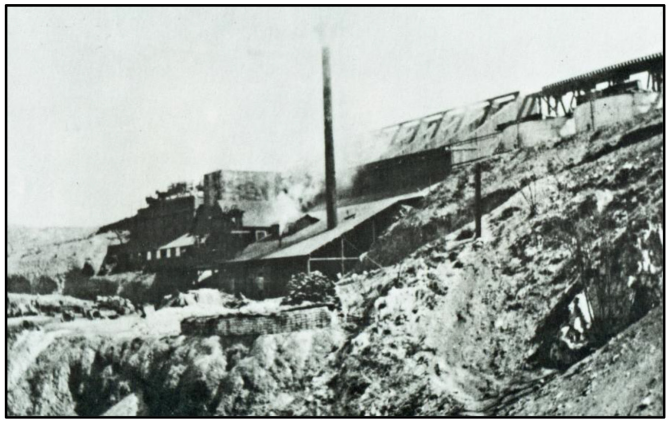


Figure 17. Historic mines, town sites, narrow gauge railroad, and roads in Helvetia Sub-district (1890-1923).



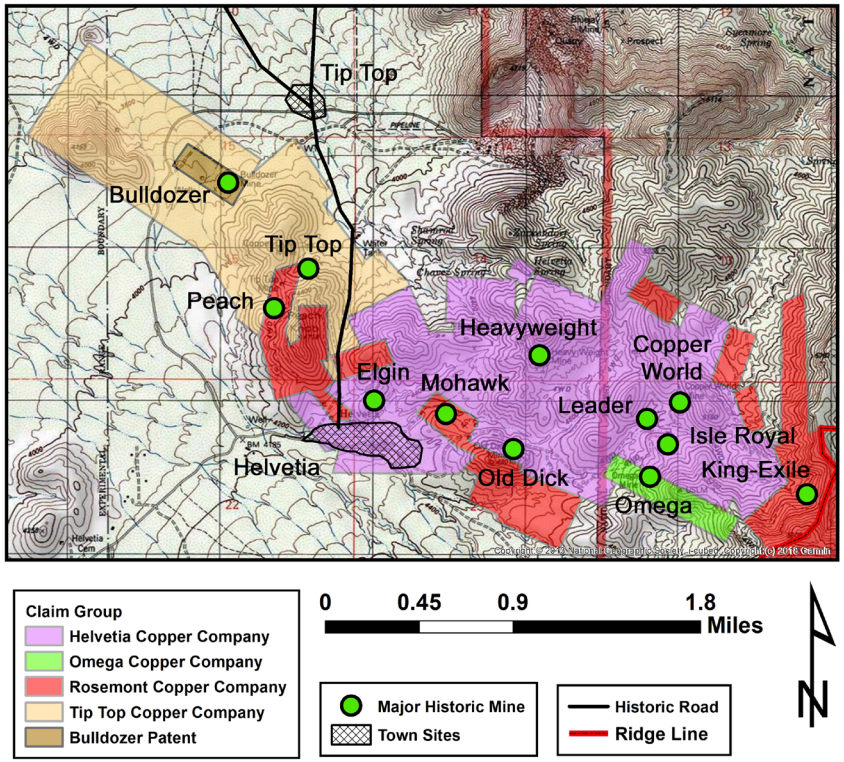
Helvetia Smelter (circa 1902)

Helvetia Smelter (2013)

Figure 18. Helvetia smelter in 1902 and remnants of its foundation today. (Photo of Helvetia smelter in 1902, courtesy of Arizona Historical Society; Photo of Helvetia smelter by David Briggs, December 2013).

Figure 19. Ten-ton saddle tank Porter 0-4-0 locomotive at Helvetia, circa 1901. (Courtesy of the Arizona Historical Society).

Figure 20. Mining Claim Map of Helvetia Sub-district, circa 1900-1910 (Modified from Schrader, 1915).



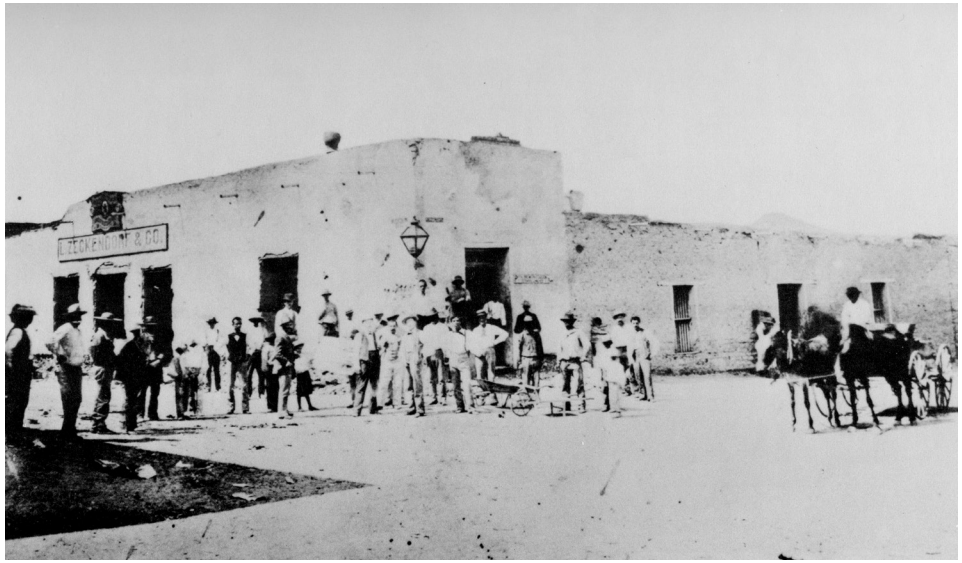


Figure 21. Zeckendorf's Tucson store at corner of Main and Pennington, circa 1880s (Courtesy of the Arizona Historical Society – B 39768).

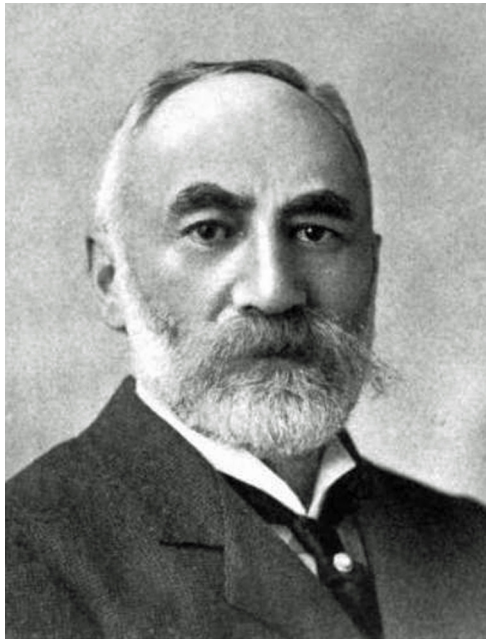


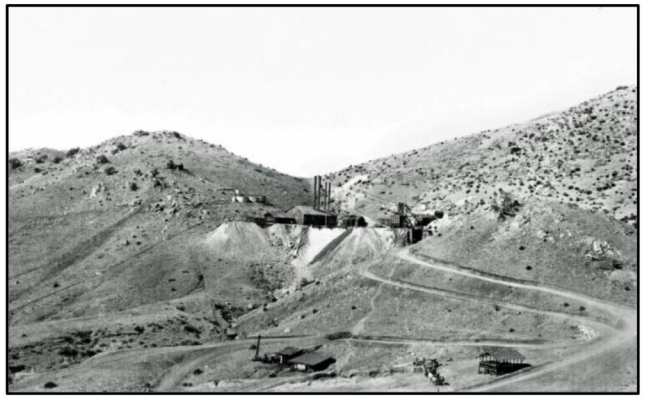
Figure 22. Louis Zeckendorf (1838-1937) was a prominent Tucson merchant and entrepreneur (Photo from Anonymous, 1901).

Figure 23. Shallow surface pits at the Elgin Mine were intermittently mined from the mid-1940s until 1960 (Photo by David Briggs, December 2013).

Figure 24. Isle Royal Mine in 1909 and 2004. (1909 Photo from Schrader, 1915; 2004 Photo from WestLand Resources, Inc., 2012).

Isle Royal Mine (1909)

Isle Royal Mine (2004)



Copper World Mine (1909)

Copper World Mine (2004)

Figure 25. Copper World Mine in 1909 and 2004. (1909 Photo from Schrader, 1915; 2004 Photo from WestLand Resources, Inc., 2012).

Figure 27. Edward Boyce (1862-1941) was the president of the Western Federation of Miners from 1896 until 1902, circa 1903 (Photo from Anonymous, 1903).

Azurite and Aurichalcite, Omega Mine

Malachite, Omega Mine

Figure 26. Copper oxide minerals from the Omega Mine, Helvetia Sub-district (Azurite and Aurichalcite Photo from Mineral Auctions.com; Malachite Photo from Online Mineral Museum).

Figure 29. Discarded slag dump in wash below the Helvetia smelter site (Photo by David Briggs, December 2013).

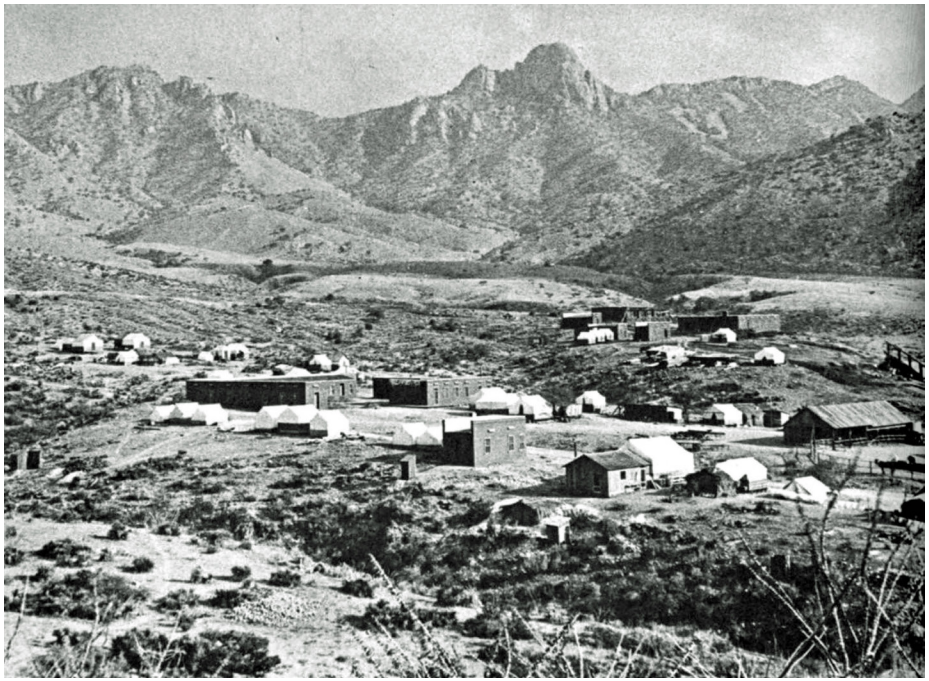


Figure 30. Helvetia, Arizona, looking east, circa 1901 (Courtesy of the Arizona Historical Society).

Figure 31. Helvetia Copper Company store, circa 1902. (Courtesy of Arizona Historical Society – AHS, PC220f6_3517).

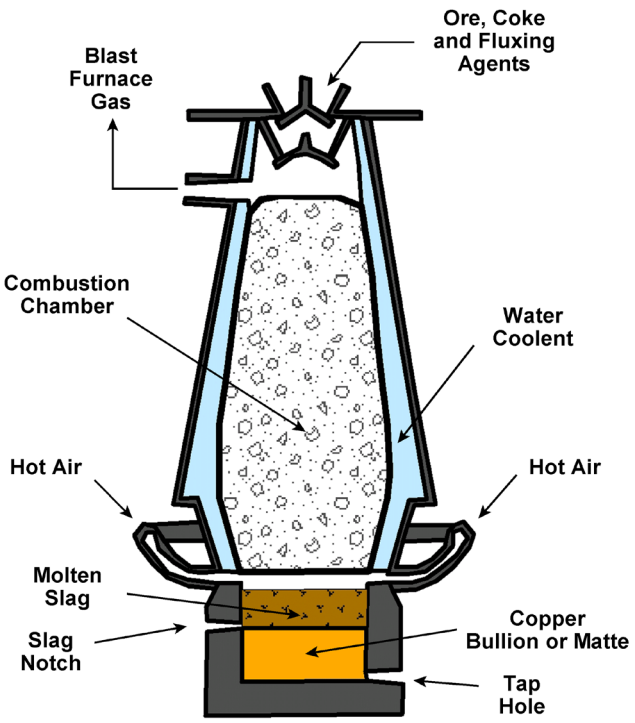


Figure 28. Sketch of a water-jacketed blast furnace employed by copper industry during late 1800s and early 1900s (Modified from Tyrocity.com – Extraction of Copper from Copper Pyrite).

The blast furnaces at Helvetia processed both oxide and sulfide ores from which a copper bullion (90 to 95% copper) or copper matte product (55% Cu) were produced, respectively.

Ore, fluxing agents (limestone), and coke were added to the top of the blast furnace while hot air was forced upward through the column of materials in the combustion chamber. The ore was melted to separate the denser copper bullion/matte from the lighter barren slag. The slag was withdrawn from the furnace through the upper slag notch and discarded (Figure 29), while the copper bullion/matte was recovered from the lower tap hole.

The copper bullion and matte were shipped by wagon to the Vail rail head for shipment to a refinery or smelter, respectively. The copper matte (a mixture of cuprous sulfide (Cu2S) and ferrous sulfide (FeS)) was mixed with silica and treated in a copper converter, which removed the iron and sulfur to produce a metallic copper product, known as blister copper. The blister copper contained approximately 98 to 99% copper along with minor amounts of silver and gold.

The copper bullion and blister copper were further electrolytically refined to produce a commercial copper product, containing 99.99% copper (Rickard, 1987).

Life in the Helvetia Mining Camp

According to the 1900 Census, the Helvetia Sub-district had a population of 612, with 562 residents located in Helvetia and 50 at the old Columbia mining camp near the Bulldozer mine (Buckles, 2013).

Helvetia was a multicultural community with residents of Mexican, Anglo-American, European, Asian, African-American, and Yaqui Indian extraction (Figure 30). However, it is always remembered as a Mexican camp, because the majority of its residents (60%) were of Mexican descent. Most of its Mexican residents were from northern Mexico, a region that had a long history of underground mining (Buckles, 2013).

Like many communities in Arizona, residents of Helvetia participated in organized sporting events, drilling contests, horse racing, Fourth of July celebrations, and weekly dances. Religious services were held at an old adobe building that served as a Catholic church. Mexican fraternal organizations helped provide a sense of community to Helvetia's Hispanic residents (Buckles, 2013).

Helvetia was a prosperous community that had daily mail and passenger service to Vail (17 miles) and tri-weekly stage service to Tucson (30 miles). Its diverse business sector included hotels, restaurants, stores (Figure 31), a boarding house, four saloons, stable, baker, shoemaker, doctor, blacksmith, butcher, Chinese laundry, barbers, and two sporting women (Buckles, 2013).

The cost of living at remote mining camps like Helvetia was higher than in larger communities, which benefited from the increased competition between numerous merchants. The additional costs of transporting supplies by wagon from the Southern Pacific railheads at Tucson and Vail also contributed to the higher cost of living.

Compared with modern standards, housing at Helvetia during the early 1900s was primitive (Figure 32). Many residents of Helvetia lived in "tent tops". These temporary structures had canvas roofs and

wooden sides with dirt or wood floors. Much of this housing could be purchased by the miners as prefabricated and easily assembled kits. Many of the Mexican workers used traditional building materials, including wattle and daub and bear grass, to construct their homes (Schaefer, 1979).

During the early 1900s, poor sanitary conditions in Helvetia resulted in the spread of infectious diseases, most likely through the contamination of the food and water. Infant mortality was particularly high, with most of the deaths occurring at an age of less than two years. Tuberculosis, a highly infectious lung disease that was also known as “consumption”, appears to have been fairly common in Helvetia (Buckles, 2013).

Helvetia is remembered as a rowdy community known for its "pay day" brawls. On most occasions these scrapes consisted of nothing more than a fist fight or perhaps a joust with knives. However, occasionally they were more serious. On one occasion, a prolonged altercation fueled by alcohol that lasted for 36 hours involved numerous gun and knife fights, which resulted in two deaths and six injuries (Feil, 1965).

Like many other mining camps of the period, Helvetia had its share of lawlessness. Homicide was a fairly common occurrence. The absence of law enforcement throughout much of Helvetia's early history contributed to the chaos that on at least one occasion led responsible citizens of the community to resort to vigilante justice (Buckles, 2013).

The Helvetia School District was created on January 17, 1900 and a one-room frame school house was opened in February 1900 (Figure 33). Florence E. Cowan, Helvetia's first teacher, was paid $65 per month (equivalent to $1,983 per month in 2020 dollars). Only 53 of the 101 children in the school district attended school during its first year (February 1900 to June 1900), making Helvetia Pima County's third largest school district (Buckles, 2013). During the second year (1900-1901), Edith Stratton taught 61 students and received compensation of $80 per month (equivalent to $2,413 per month in 2020 dollars).

Student enrollment at the Helvetia school fluctuated as the mining camp's population swelled and contracted. By the late 1910s and early 1920s, only about a dozen students remained, many of whom lived at nearby ranches. The Helvetia school was closed in 1923.

Eulalia “Sister” Bourne (Figure 34) was one of Helvetia’s more notable teachers. Born in West Texas in 1892, she was the oldest of five girls, who received the nickname "Sister" from a younger sibling, who could not pronounce Eulalia. Serving as Helvetia's school teacher from 1916 until 1920, she arrived during the mining camp's short-lived revival during World War I. Unable to speak Spanish, she was tasked with teaching children with whom she was unable to communicate (Buckles, 2013).

Undaunted by this challenge, Eulalia Bourne acquired some Spanish grammar books and with the assistance of her students learned to speak Spanish. In this way Eulalia helped pioneer bilingual education in Arizona, in spite of a state law that required only English to be spoken in public schools. Eventually becoming proficient in Spanish, she succeeded in teaching her Mexican pupils English and the three "Rs", reading, writing and arithmetic.

Helvetia Today

Little evidence of the Helvetia town site remains today (Figures 35 and 36). This is in part due to the temporary nature of much of the early housing, which could be easily dismantled and relocated when its owner moved to another site.

By July 1969, many of the more substantial adobe and wooden structures (Figure 37) that survived Helvetia’s demise were destroyed to discourage squatters.

Rosemont Sub-district (1879-1961)

Early mines in the Rosemont Sub-district were located in the headwaters of Wasp and McCleary canyons along the eastern slope of the Santa Rita Mountains (Figures 38).

The community of Old Rosemont (previously known as McCleary Camp) was located at Rosemont Junction, situated at the confluence of Barrel and Wasp canyons. New Rosemont was located in the headwaters of McCleary Canyon, approximately 2,500 feet southeast of Gunsight Pass. A panoramic view of the Rosemont Sub-district is shown in Figure 39.

Early prospecting along the eastern flank of the Santa Rita Mountains began in 1879. James K. Brown staked the Narragansett claim in March 1879, while William B. McCleary and Thomas Deering located the Backbone claim in 1885 (Ayres, 1984).

Other early claims in the Rosemont Sub-district included Mohawk Silver located in 1888, Altamont and Tremont in 1892 and Empire in 1894. (Ayres, 1984).

By the early 1890s, William McCleary and L. J. Rose held 30 mining claims along the eastern flank of the Santa Rita Mountains. They established the Rosemont Smelting and Mining Company in 1894. Its principal shareholders included L. J. Rose (5,000 shares), William McCleary (3,000 shares) and William Shaw (1,000 shares) (Ayres, 1984).

By early July 1894, 50 men were at work preparing the smelter site and developing the Chicago Mine (?). A 60-ton per day blast furnace was commissioned at Old Rosemont in late October 1894 (Figure 40).

However, this mining venture soon faced serious financial problems, when its mines were unable to supply sufficient amounts of ore to maintain efficient smelter operations. In an effort to cut their losses, mules were employed to haul ore from the Mohawk Mine at Helvetia over the crest of the Santa Rita Mountains to feed the Old Rosemont smelter (Schaefer, 1979). These difficulties were further compounded when the Old Rosemont smelter was destroyed by an explosion in July 1895.

Rosemont Copper Company (1896-1961)

Adolph and Leonard Lewisohn (Figure 41), prominent New York merchants and industrialists, purchased the Rosemont Smelting and Mining Company in February 1896 for $30,000 to $40,000. Initially operating under the name of Rosemont Copper Mines, this business was renamed the Rosemont Copper Company soon thereafter. In December 1896, the Lewisohns purchased 12 mining claims from John Weigle, including the Mohawk mine in the Helvetia area (Ayres, 1984).

Rosemont was among the lesser known mining holdings of Lewisohn Brothers of New York, who had substantial investments in Butte, Montana with interests in the Butte and Boston and Boston and Montana mining companies. Other holdings included the Old Dominion Mine at Globe, Arizona and the Tennessee Copper Company at Ducktown, Tennessee. Following Leonard's death in 1902, Adolph Lewisohn organized the General Development Company in January 1906. The General Development Company formed the Miami Copper Company in Nov 1907 to develop its discovery at Miami, Arizona (Stevens, 1911).

By January 1897, the Rosemont Copper Company had 40 men working at the site preparing it for production (Figure 42). The smelter at Old Rosemont was repaired and resumed operations in June 1897 (Ayres, 1984). This facility produced a matte product that was transported by wagon to the Southern Pacific railhead at Vail (18 miles) or the New Mexico and Arizona railhead at Sonoita (14 miles). On the return trip, the wagons were loaded with coke to fuel the smelter and supplies for the settlement (Ayres, 1984).

As at Helvetia, smelting operations at Rosemont also suffered from the lack of a reliable source for coke, requiring it to ship hand-sorted, high-grade ores to regional smelters. This significantly increased its production costs, which eventually resulted in the suspension of operations in 1903. Rosemont Copper's properties were intermittently operated by lessees until the late 1950s (Ayres, 1984).

Patented Mining Claims (1899-1909)

The majority of the patented mining claims in the Helvetia-Rosemont Mining District were held by the Rosemont Copper Company and the Helvetia Copper Company (Figure 43).

The Rosemont Copper Company patented 45 lode claims and 7 mill site claims in April 1899. The Helvetia Copper Company patented 40 lode claims and 8 mill site claims in August 1900.

Life in Old Rosemont (1894-1910)

According to the 1900 Census, the community of Old Rosemont (Figure 44) had a population of 134, including 56 children under the age of 14. Dominantly of Mexican heritage, its residents consisted mostly of miners, their families, and a few vaqueros (i. e., cowboys), who worked at nearby ranches. Other members of the community included a hotel manager, store keeper, butcher, teamsters, and blacksmith (Schaefer, 1979).

Old Rosemont was a small family-oriented community, unlike its neighbors, Helvetia and other southern Arizona mining camps that were known for their rowdiness. The lack of services, compelled residents of Old Rosemont to patronize the general store at Greaterville, while others relied on monthly trips to Tucson to pick up supplies, rather than purchase from the limited selection of more expensive goods available at the Old Rosemont store (Schaefer, 1979).

Some individuals hunted game for meat. On occasion a steer would be purchased from a nearby ranch, slaughtered and distributed to community's residents. With no refrigeration, the meat was either hung in a tree and protected by a canvas bag or cut up and dried to make jerky (Schaefer, 1979).

Constructed around 1894, the Old Rosemont hotel was the center for social gatherings (Figure 45). It served as the residence for George Scholefield from 1915 until 1927. The Old Rosemont hotel was dismantled around 1938 for its lumber and brick (Ayres, 1984).

Stage coach service connecting Old Rosemont with the Pantano rail head (21 miles) was established in 1894. Its post office opened in August 1894 and closed in May 1910 (Ayres, 1984).

Children between the age of 5 and 13 attended the school at Old Rosemont, which operated from 1895 until 1909 (Figures 46). After 1909, students attended public school in Greaterville (Ayres, 1984).

Despite receiving salaries that ranged from $65 to $75 per month (equivalent to $1,984 to $2,289 in 2020 dollars), the turn-over rate for teachers was high in this remote community. Teachers commonly boarded with a local resident or lived in the hotel (Ayres, 1984).

Coronado National Forest

President Theodore Roosevelt established the Santa Rita Forest Reserve in April 1902. Armour Scholefield, the eldest son of George Scholefield, was appointed the reserve's first forest ranger in December 1904. He built the first ranger station in early 1905, which was constructed from materials scavenged from an abandoned cabin located on the reserve (Figure 47). Armour Scholefield died in November 1906 (Ayres, 1984).

Initially administered by the General Land Office (Department of the Interior), the Santa Rita Forest Reserve was transferred the U. S. Forest Service (Department of Agriculture) in February 1905. The Santa Rita Forest Reserve was renamed Santa Rita National Forest in March, 1907. It was combined with the Santa Catalina National Forest and the Dragoon National Forest in July 1908 to form the Coronado National Forest.

Armour's younger brother, Carl Scholefield became the forest ranger in late 1908. The older ranger cabin was replaced by a newer frame house (Figure 48) in late 1912, where Carl Scholefield lived with his family until 1921, when he was transferred to the Chiricahua National Forest. This structure was used by the Forest Service until 1932 and removed from the site after 1937 (Ayres, 1984).

Compare the photos of Old Rosemont for 1906 and today (Figure 44). The sparse vegetation in the 1906 photo reflects severe overgrazing and overuse of other forest resources prior to the early 1900s. Timber was harvested in many areas of the Santa Ritas for use as construction materials and mine timbers. This was further compounded by the widespread use of firewood to fuel steam engines associated with mining as well as for domestic heating and cooking (Bahre, 1998).

Although Congress allowed citizens of the Arizona Territory to harvest timber from the public domain for mining and domestic purposes in 1880, the General Land Law Revision Act of 1891 authorized the creation of forest reserves to conserve range and forest resources. The Santa Rita Forest Reserve was one of the first forest reserves established in southeastern Arizona (Bahre, 1998).

As early as 1902, the Santa Rita Forest Reserve began regulating land tenure and use of federal lands, which had been previously used without regard to ownership or impacts on those lands. Restrictions were placed on the harvesting of timber and cutting firewood, construction of wagon roads, and water usage. Fire suppression measures were instituted to protect forest resources (Ayres 1984).

While no new ranches or other inholdings (except mining claims) were permitted to the established within the reserve, existing ranches retained grazing rights on adjacent federal lands, which were called

allotments. The number of livestock that could be run on an allotment was highly regulated and based on the distribution and amount of rainfall, range conditions and effects on vegetation by previous grazing practices (Schaefer, 1979).

New Rosemont and the Narragansett Mine (1915-1961)

James K. Brown arrived in Tucson in 1877 and purchased a ranch in Sahuarita, which became one of the largest cattle ranches in southeastern Arizona (Figure 49). In addition to ranching, Brown also prospected and served as sheriff of Pima County from 1891 until 1892 (McClintock, 1916b).

James K. Brown staked the Narragansett claim in March 1879 and intermittently worked the site for more than three decades before selling it and seven other claims to William Ramsdell for $60,000 in July 1915. Ramsdell incorporated the Narragansett Mines Company in September 1915 to manage the day-to-day operations at the site (Ayres, 1984).

The Narragansett Mine was served by the nearby community of New Rosemont, which had a population of around 200. It is remembered as stable community of Mexican miners and their families. Miners were issued coupons instead of money, which could be used to purchase goods at the company store (Figure 50) (Schaefer, 1979). Except for the occasional visiting prostitute, no single women resided at New Rosemont (Ayres, 1984).

Located on a large, flat-lying ridge below the Narragansett Mine, living conditions at New Rosemont were primitive by modern standards. Only a few permanent wood frame structures were present at the site. The remaining dwellings were temporary structures that were similar to those found at Helvetia. Sanitary conditions were poor (Ayres, 1984). Very little physical evidence of this community remains today.

The Narragansett Mine was the Helvetia-Rosemont Mining District's largest producer during World War I (Figure 51). This underground operation was accessed through an adit on the Narragansett Bay claim and via a 100-foot inclined shaft on the Daylight claim. It contained 2,600 feet of drifts and cross-cuts, 260 feet of inclined winzes and many stopes, most of which lay below the haulage level (Creasey and Quick, 1955). High-grade fluxing ores from this operation were transported to the Vail railhead (18 miles) for shipment to regional smelters.

Despite the high price of copper received by mining companies during World War I, the Narragansett operation was plagued by financial problems throughout much of its life. In an effort to keep the mine operating, the Narragansett Copper Company was formed in January 1917. It gave the Narragansett Mines Company four notes, totaling $300,000 in return for a mortgage on 15 mining claims (Ayres, 1984).

The Narragansett Mines Company subsequently sold these notes to Albert Steinfeld (Figure 52), the nephew of Louis Zeckendorf (Figure 22). Declining copper prices following the end of World War I made operations at the Narragansett Mine unprofitable. Realizing his investment was in jeopardy, Steinfeld filed a law-suit against the Narragansett Copper Company. He received a judgment in August 1919 and was awarded the Narragansett property as a part of the settlement (Ayres, 1984).

Albert Steinfeld arrived in Tucson in January 1872 to work at the Zeckendorf store. After his uncle William Zeckendorf resigned from the business, Albert was made a partner in L. Zeckendorf and Company in February 1878 (Fierman, 1981). Like his uncles, Albert was a shrewd businessman, who invested in many Arizona mining ventures.

Steinfeld purchased L. Zeckendorf and Company from his uncle in May 1904 and renamed it Albert Steinfeld and Company. This Tucson business operated a department store at the southwest corner of Stone and Pennington from 1906 until 1974 (Figure 53), when it was relocated to El Con Mall before closing its doors in August 1984.

Lessees continued limited operations at the Narragansett Mine until 1920. Albert Steinfeld subsequently acquired patents on seven lode claims located in and around the Narragansett Mine in February 1926 (Figure 54).

Limited mining operations resumed at the Narragansett Mine during the late 1930s with the ores being extracted from a shallow surface pit during the late 1950s. Its last recorded production occurred in February 1961 (Ayres, 1984).

Tent Top Dwelling at Helvetia

Traditional Housing of Mexican Workers

Figure 32. Typical housing used by residents of Helvetia during the early 1900s (Tent Top Dwelling from Schrader, 1915; Tradition Housing of Mexican Workers Photo courtesy of Arizona Historical Society).

Figure 33. Edith Stratton and students at the Helvetia school, circa 1901. (Courtesy of Arizona Historical Society, Places: Helvetia_3103).

Figure 34. Eulalia "Sister" Bourne (1892-1984) (Courtesy of Arizona Historical Society).

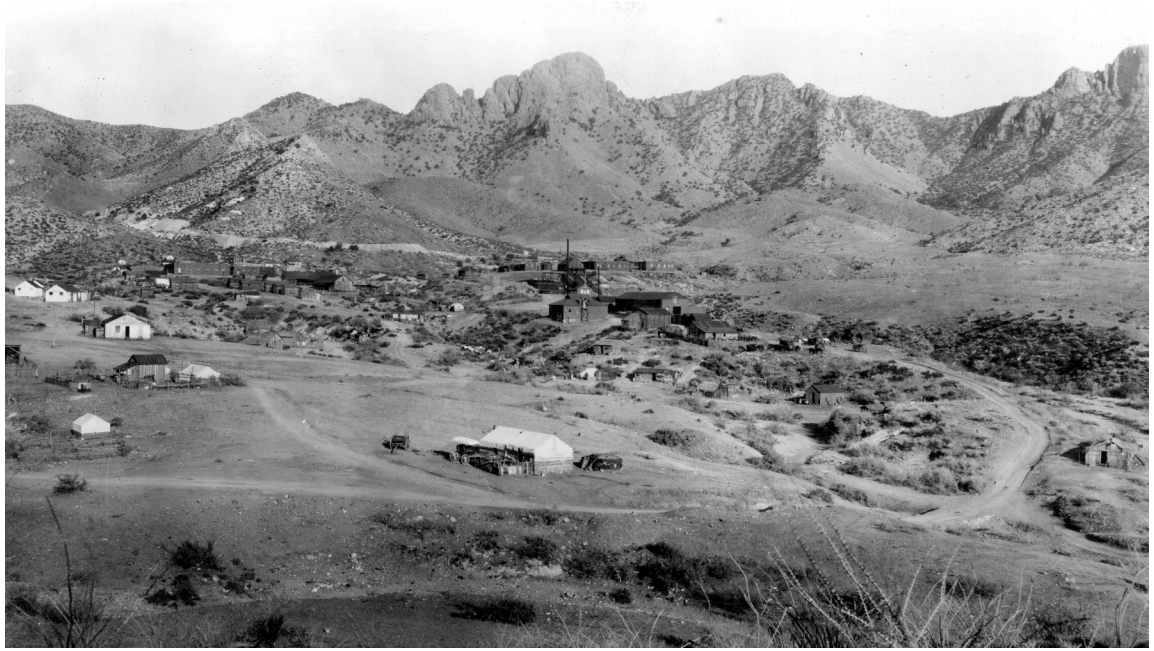
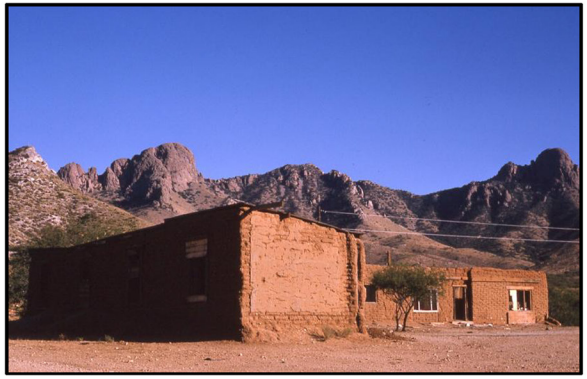


Figure 35. Town site of Helvetia, as it appeared in 1909 (looking east) (Photo from Schrader, 1915).

Figure 36. Town site of Helvetia as it appeared in September 2011 (looking east) (Photo from Buckles, 2013)

Figure 37. Adobe and wooden structures at Helvetia during the 1960s (Photos by Jan Rasmussen in October 1965 and October 1968, respectively).



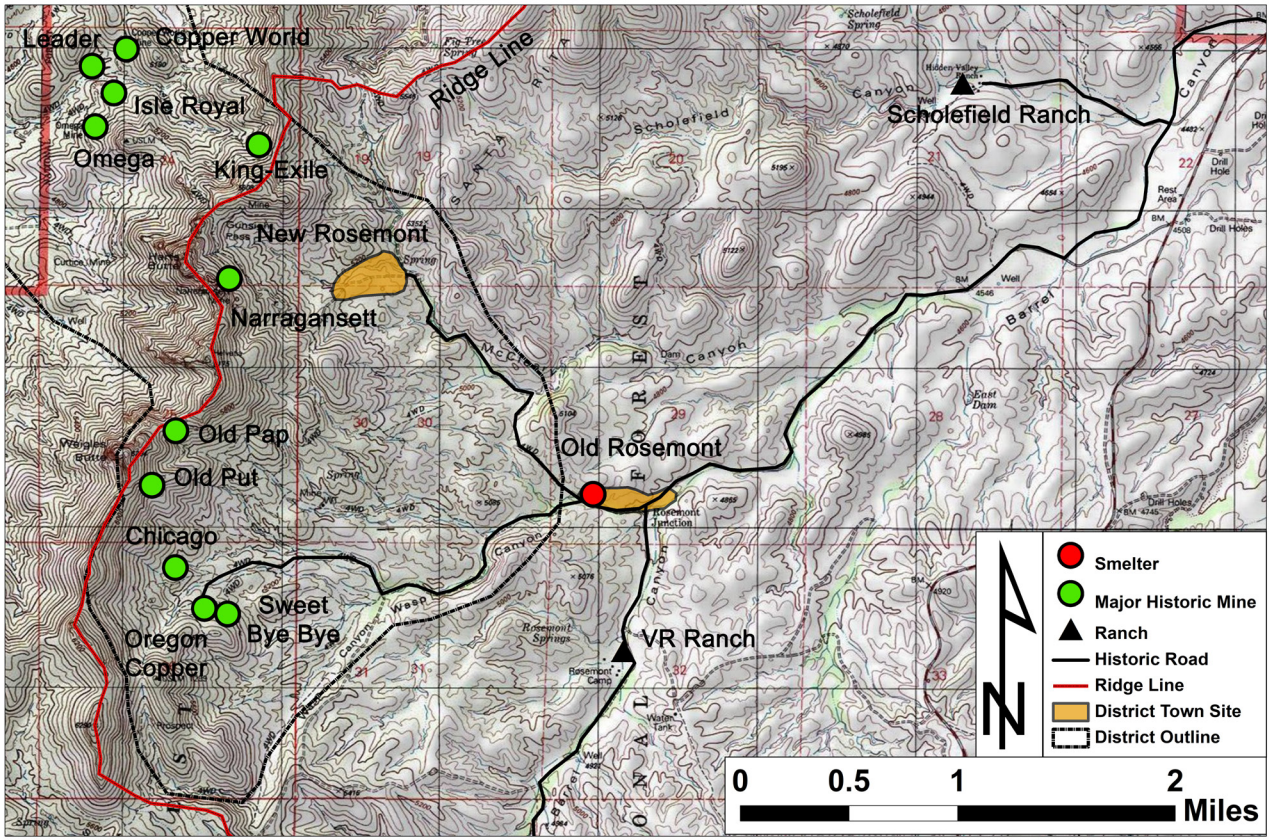


Figure 38. Mines, communities and ranches in the Rosemont Sub-district (1894-1920).

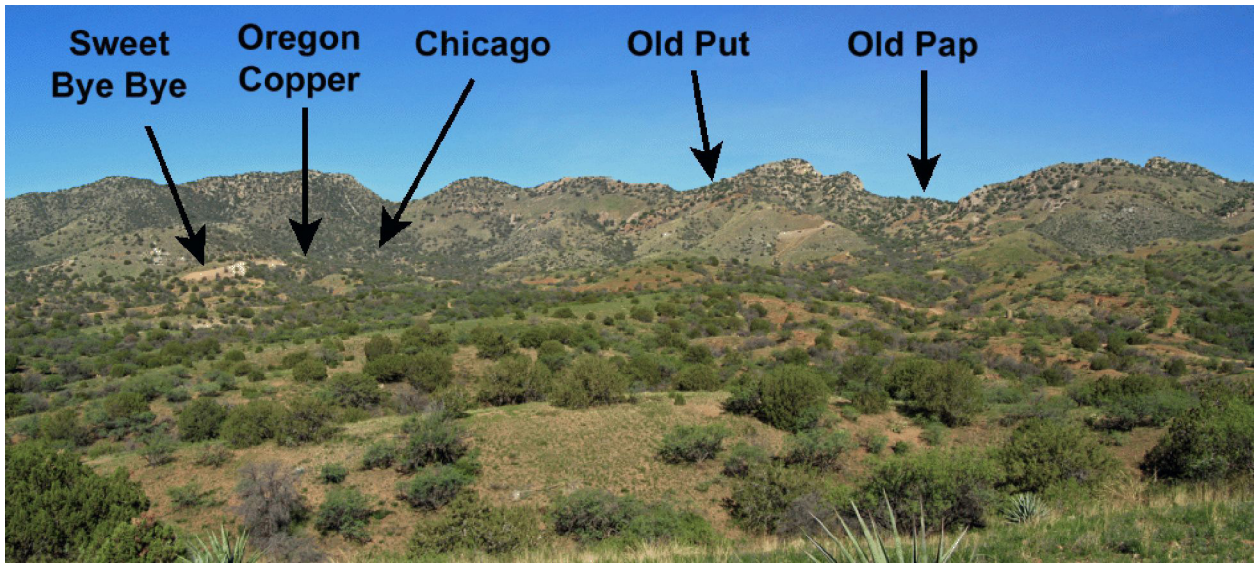
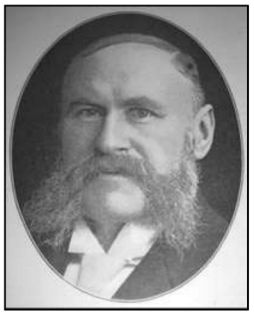


Figure 39. Panorama of Rosemont Sub-district showing the location of the major mines (looking west) (Photo by David Briggs, August 2008).

Figure 40. Slag dump at Old Rosemont smelter site (Photo by David Briggs, April 2007).

Adolph Lewisohn
(1849-1938)



Leonard Lewisohn
(1847-1902)

Figure 41. Adolph and Leonard Lewisohn were among the first entrepreneurs to recognize the importance copper would play in the technological revolution that began during the late 1800s (Photos from Mining Foundation of the Southwest).

Figure 42. Old Put was one of the early mines in the Rosemont Sub-district (Photo by David Briggs, July 2008).

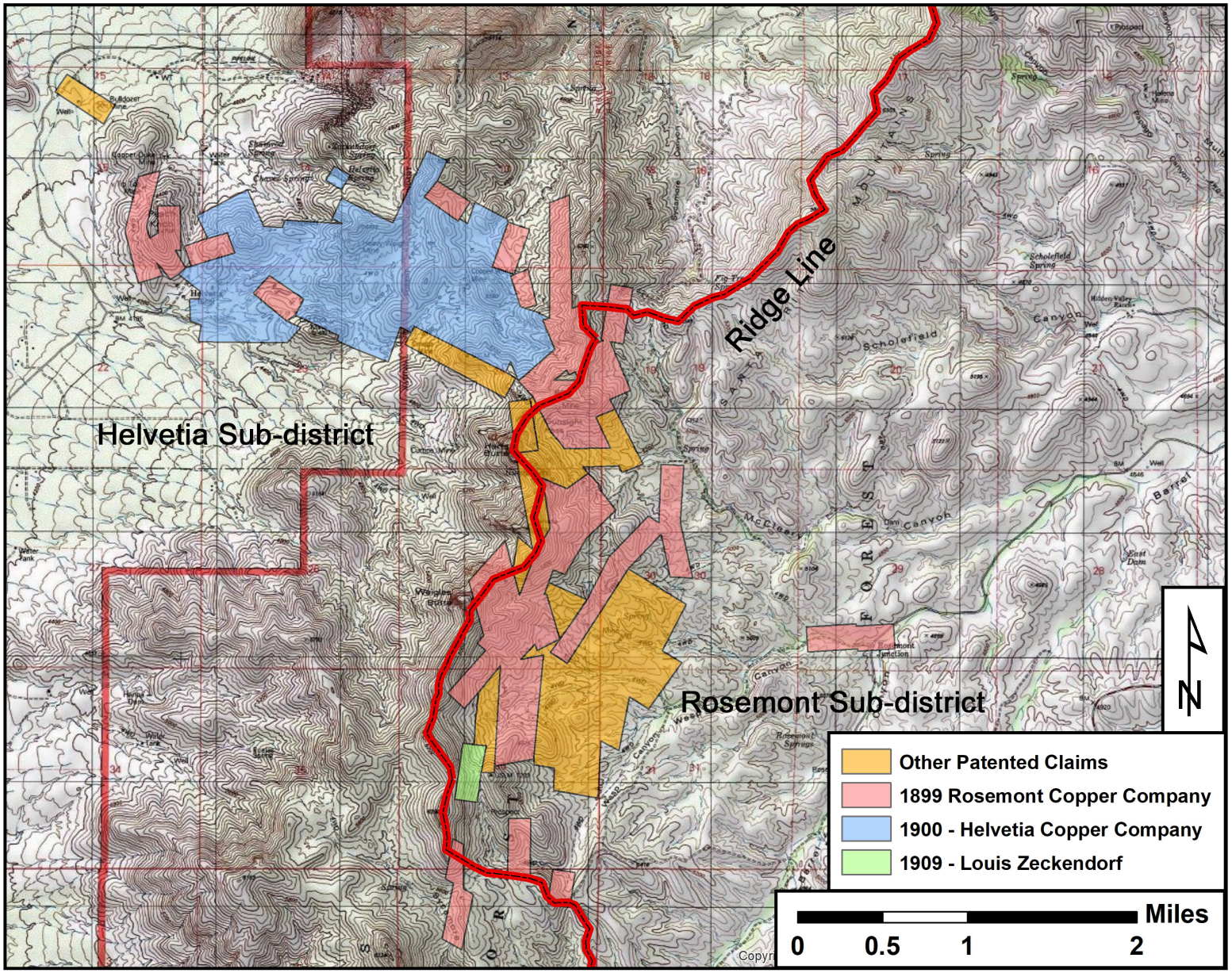
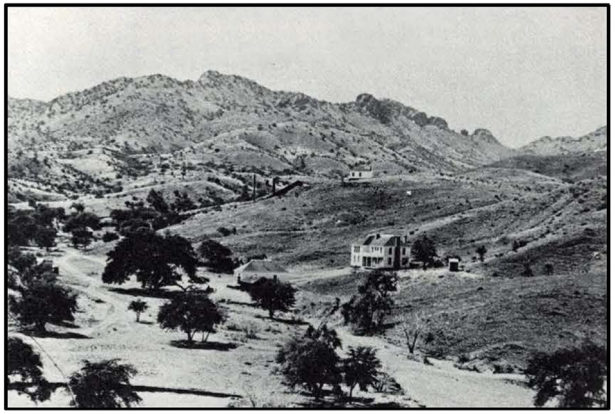


Figure 43. Patented mining claims (1899-1909) in the Helvetia-Rosemont Mining District (Prepared from Bureau of Land Management records).



Old Rosemont (1906)

Old Rosemont (2004)

Figure 44. Old Rosemont in 1906 and 2004 (Photos from WestLand Resources, Inc., 2012).

Figure 45. Old Rosemont hotel, circa 1915-1929 (Photo from Ayres, 1984).

Figure 46. One room school house at Old Rosemont, circa 1911. (Photo from Ayres, 1984).

Figure 47. Carl Scholefield at the first Old Rosemont Ranger Station, circa 1909. (Photo from U. S. Forest Service).

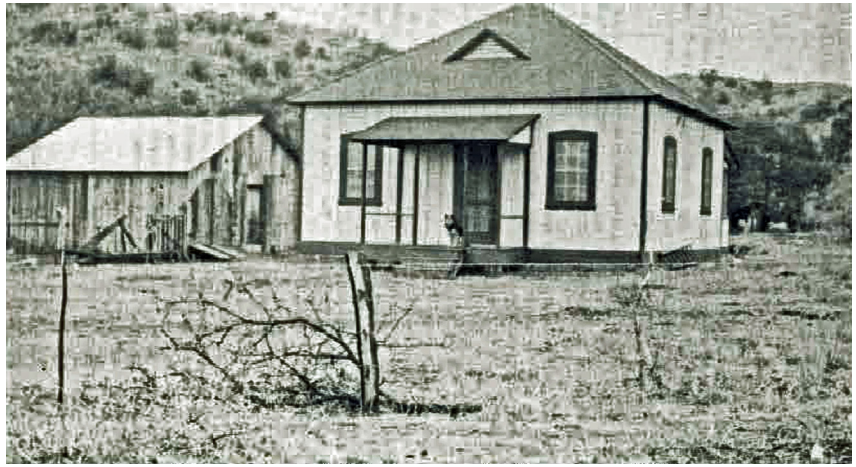


Figure 48. Forest ranger's house at Old Rosemont, circa 1912. (Photo from U. S. Forest Service).

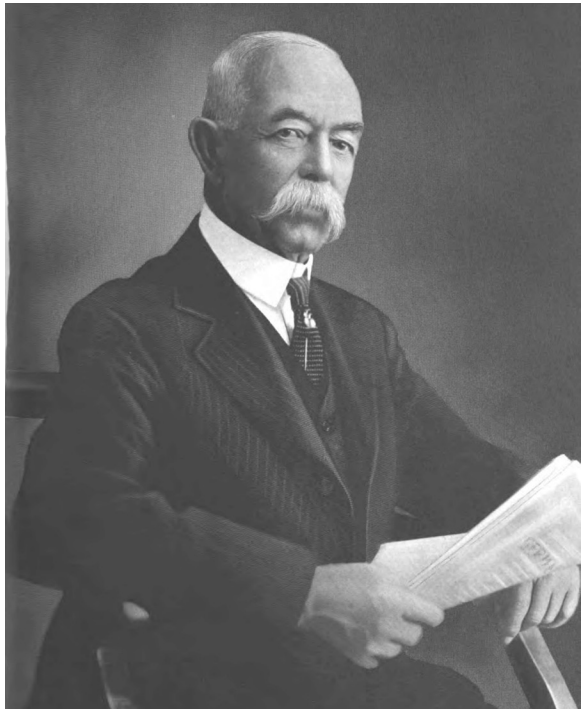


Figure 49. James K. Brown (1849-1922), pioneer, rancher, prospector, and Pima County sheriff (Photo from McClintock, 1916b).

Figure 50. New Rosemont company store, circa 1917 (Photo from Ayres, 1984).

Figure 51. Narragansett Mine is located along the ridge line, while the former community of New Rosemont is located in the foreground (Photo by David Briggs, March 2007).

Figure 52. Albert Steinfeld (1854-1935) was a prominent Tucson merchant, circa 1880 (Photo from the Arizona Historical Society #12608). Albert and his son Harold owned the Tucson's Pioneer Hotel, which opened at the northeast corner of Stone and Pennington in December 1929. In December 1970, the Pioneer Hotel fire claimed 29 lives, including Harold Steinfeld and his wife, Margaret, who resided in the penthouse.

Figure 53. Steinfeld's Tucson department store at corner of Stone and Pennington (circa 1940) (Photo provided by the Arizona Historical Society AHS 90480).

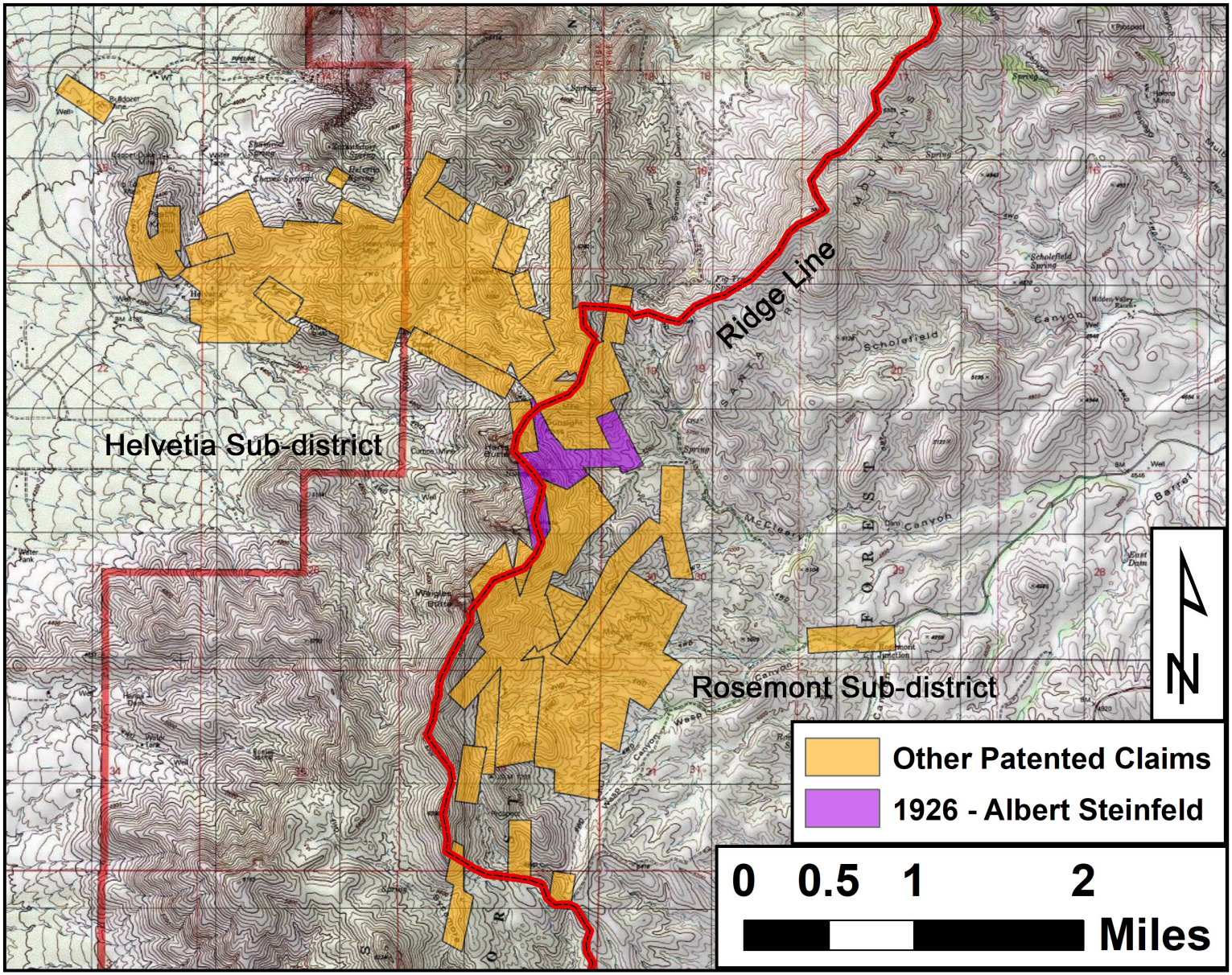


Figure 54. Patented mining claims (1926) in the Helvetia-Rosemont Mining District (Prepared from Bureau of Land Management records).

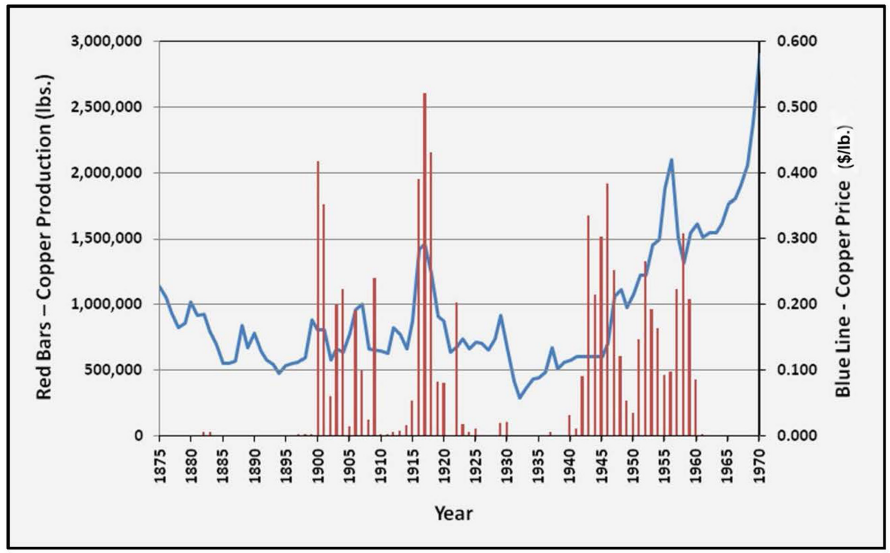


Figure 55. Annual copper production for the Helvetia-Rosemont Mining District (Source – U. S. Bureau of Mines).

Figure 57. Front end loader and haul truck at Santa Rita Quarry during 1990s (Photo from Arizona Geological Survey).

Figure 56. Santa Rita Marble Quarry, looking east (Photo by David Briggs, December 2013).

Figure 58. Processing plant at Santa Rita Quarry during 1990s (Photo from Arizona Geological Survey).

Figure 59. Natural cliff face of marble at the Santa Rita Quarry, which gave the Santa Rita Mountains its name (Photo by David Briggs, December 2013).

Historic Production at Helvetia-Rosemont

Despite the widespread presence of copper in the Helvetia-Rosemont Mining District, early mining activities were relegated to small scale mining operations that collectively contributed little to the nation's economy. Over its 94-year life, 33 historic mines recovered approximately 36.8 million pounds of copper from 438,400 tons of ore (Table 1). In comparison, ASARCO's Silver Bell operation, located northwest of Tucson, produced approximately 42.2 million pounds of copper from 14.7 million tons of ore during 2018 (Grupo Mexico, S. A. de C. V., 2019).

Table 1. Historic production from the Helvetia-Rosemont Mining District (U. S. Bureau of Mines).

Most of the district's mines were small with reported total copper production exceeding more than a million pounds at only nine operations. The Narragansett-Daylight Mine was the district's largest producer, recovering approximately 8.4 million pounds of copper from about 97,100 tons of ore. Only minor amounts of by-product gold and silver were recovered during this period.

Annual copper production at the Helvetia-Rosemont Mining District is shown as red bars on the graph shown in Figure 55. The blue line represents the price of copper in dollars per pound. Note the positive correlation between copper production and copper prices.

Mine Name	Years	Ore Treated Short Tons	Copper Lbs.	Lead Lbs.	Zinc Lbs.	Gold Troy Oz.	Silver Troy Oz.
Bulldozer	1882 - 1960	6,733	613,423	0	0	8	6,453
Copper World	1900 - 1960	17,361	1,777,202	0	0	49	15,534
Elgin	1901 - 1960	90,901	4,266,826	0	0	555	33,052
King-Exile	1913 - 1959	69,571	8,158,096	66,115	376,715	33	93,057
Leader	1885 - 1944	35,088	3,719,579	0	0	154	34,742
Mohawk	1885 - 1948	36,637	2,675,699	3,000	28,020	32	7,325
Narragansett-Daylight	1907 - 1961	97,129	8,441,229	143,425	254,803	59	63,469
Old Dick	1940 - 1952	11,999	893,424	0	0	88	7,732
Omega	1875 - 1920	6,742	717,509	41,978	0	0	7,992
Peach	1916 - 1952	11,144	1,174,777	4,263	460,193	2	8,942
Tip Top	1899 - 1956	27,417	2,766,422	0	0	6	11,194
Other Producers (22)	1881 - 1969	26,697	1,572,052	112,858	8,786	283	72,107
District Total	1875 - 1969	438,419	36,776,238	371,639	1,128,517	1,269	361,599

There were three main periods of copper production, one from 1900 until 1910, a second during World War I and a third that began during the early 1940s and continued until 1960. Approximately 65% of the ore mined and 50% of the copper recovered at Helvetia-Rosemont was mined during the 1940s and 1950s.

The economic viability of early mining operations at Helvetia-Rosemont was at best marginal. A slave to the fluctuating price of copper, its mines were only profitable during good times. This left few resources to cope with downturns in the copper market or deal with other unforeseen problems that commonly plagued these operations.

Their ability to compete was handicapped by the lack of a railroad connecting the Helvetia-Rosemont Mining District with the outside world. Early mining activities were all labor intensive and costly, making the viability of mining ventures of this period, uncertain. Furthermore, the technology and mining practices employed during the early 1900s were poorly suited for the majority of the mineralization encountered at Helvetia-Rosemont.

Overwhelmed by these difficulties, organized mining activities ceased and the mining camp was eventually abandoned during the early 1920s (Buckles, 2013). Only lessees remained to salvage easily accessible fluxing ores that were shipped to regional smelters until the early 1960s.

The boom-and-bust nature of many of the early mining camps resulted from their heavy dependence on a single industry. Helvetia-Rosemont was no exception. This phenomenon has also been observed in other communities, where a single industry such as timber, textiles and manufacturing was the dominant employer. More diverse economies generally fare better than those that are less diverse (Hales, 2016).

Santa Rita Marble Quarry (1961 to Present)

The large marble deposit at the Santa Rita Quarry is hosted by the Mississippian Escabrosa Limestone (Figure 56). Located in the northern portion of the Helvetia Sub-district, it was initially explored by the Paul Lime Company during 1961 (Eyde and Eyde, 1992).

The Home-Stake Production Company commenced mining operations at the Santa Rita Quarry in September 1971, producing quicklime, which was used by area copper mines to regulate pH during the treatment of their ores. Operations were suspended in April 1974, when an increase in the cost of natural gas used to fire their kilns made their operation uncompetitive (Eyde and Eyde, 1992).

Anamax explored the Santa Rita Quarry property for copper from approximately 1975 until December 1986, when it was purchased by Calcium Products of Arizona, who resumed quarrying operations in June 1987 (Figure 57). Calcium Products of Arizona produced three products: a filler grade ground limestone for wall board joint cement, marble gravel for landscape use, and decorative marble boulders (Eyde and Eyde, 1992).

Specialty Minerals, Inc., a subsidiary of Pfizer Minerals, purchased the Santa Rita Quarry property in December 1991 and continued operations until 1997, when Georgia Marble Company (a subsidiary of Imerys Marble, Inc.) acquired the operation. Imerys Marble continues to produce limestone products from the Santa Rita Quarry today (Figure 58).

When the Santa Rita Marble Quarry is viewed from distance, much of the "white scar" you see is not the result of quarry operations. When viewed from the north from an area around Corona de Tucson, most of the visible "scar" is represented by mine workings, which are located high on the north-facing ridge line. However, when viewed from the Green Valley or Sahuarita area, much of the visible landscape is actually a large, natural cliff face (Figure 59). The southern quarry and processing facility are situated within a wash, where they are largely hidden from public view.

According to local lore, this prominent natural cliff face of white marble located on the western slope of the Santa Rita Mountains reminded early Spanish missionaries of Saint Rita of Cascia (1381-1457), an Italian nun, who bore a small wound on her forehead. The Santa Rita Mountains were named in her honor (Briggs, 2016).

Brief Description of Porphyry Copper Systems

Porphyry copper deposits are very large hydrothermal (i. e., hot water) systems that occupy many cubic miles of rock surrounding and including relatively small igneous intrusive bodies that are the source for the metals and served as the thermal engines that drove these systems (Guilbert and Park, 1986).

It took economic geologists several decades to shift their prospective from outcrop and vein-stope scales to viewing these occurrences as hydrothermal systems that encompass many cubic miles of rock (Guilbert and Park, 1986). This transition coincided with the post World War II economic boom and culminated in the development of a conceptual model for porphyry copper deposits by J. David Lowell and John Guilbert in 1970. Refined versions of their simple ore deposit model continue to be useful in recognizing and evaluating the economic potential of these large mineral systems today.

As a result of these advances in the understanding of these large mineral systems, 20 large porphyry copper deposits were discovered in southeastern Arizona between 1940 and 1975 (Figure 60).

A simplified cross-section showing the spatial distribution of the mineralization and related hydrothermal alteration assemblages of a typical porphyry copper system is illustrated in Figure 61.

The term “porphyry copper” is derived from the texture of the igneous rock, which forms the intrusive bodies associated with these mineral systems (Figure 62). Porphyritic textures are characterized by larger crystals of feldspar, biotite, and quartz, known as phenocrysts, which are surrounded by a matrix of very fine-grained crystals. This texture is commonly found in intrusive bodies that have risen to a shallow level (3 to 5 km) in the earth’s crust. They initially cooled slowly, which allowed the large crystals of quartz, biotite, and feldspar to form. At some point during the cooling process, the magma was rapidly chilled and crystallized, resulting in the finely crystalline matrix surrounding the larger phenocrysts.

As the intrusive body is emplaced the outer edges of the intrusion are the first to crystallize. This crystalline rind and surrounding baked zone of sedimentary and volcanic wallrock are repeatedly broken and fractured by metal-rich volatiles released from the crystallizing magma. The volatiles and metals contained within these solutions reacted with the surrounding rocks to form a large zoned alteration halo within and around the porphyry stock.

The large alteration halo is characterized by a central zone of potassic alteration, overlain and surrounded by an intermediate phyllic zone, which is in turn enclosed by an outer propylitic zone (Figure 61).

Potassic alteration is characterized by the presence of quartz, secondary potassium feldspar and biotite (dark colored, shreddy mica) and anhydrite. It typically contains minor amounts of chalcopyrite, pyrite (i. e., fool’s gold) and molybdenite (MoS_2).

Minerals associated with the phyllic alteration include quartz and sericite (fine-grained colorless mica) with abundant pyrite (FeS_2) and lesser amounts of chalcopyrite ($CuFeS_2$) and bornite (Cu_5FeS_4).

Propylitic alteration frequently gives the rock a greenish cast, as it is characterized by green-colored minerals, such as chlorite, epidote and actinolite with calcite and minor amounts of pyrite (Figure 63).
A zone of advanced argillic alteration (quartz, clay, alunite and pyrite) commonly overlies the central portion of porphyry copper systems.

Carbonate (limestone and dolomite) strata located immediately adjacent to the porphyritic stocks are typically altered to a calc-silicate assemblage, known as skarn, which includes garnet, diopside, tremolite and/or serpentine with chalcopyrite and pyrite (Figure 64). The outer zone separating the skarn and from unaltered limestone is normally occupied by recrystallized limestone, which is known as marble.

The copper-bearing ore body typically occupies a shell-like body that straddles the boundary between the potassic and phyllic alteration zones and surrounds a low-grade core, located at the center of the system. Copper ores are characterized by the following sulfide-bearing minerals: chalcopyrite, bornite, and minor molybdenite with minor to moderate amounts of pyrite (Figure 65).

Porphyry copper deposits generally contain 100 million to several billion tons of ore, averaging 0.3% to 2.0% copper. World-wide, they account for more than 60% of the annual world copper production

and contain approximately 65% of known copper resources (John et. al., 2010).

Geology of the Helvetia-Rosemont Mining District

The widespread occurrence of copper in the Helvetia-Rosemont Mining District has intrigued many, who have evaluated the area's economic potential (Anzalone 1995 and Bowman, 1963). Early efforts to understand the distribution of the mineralization and its related alteration assemblages were hindered by the district's complex structural setting, which continues to challenge geologists today.

Copper mineralization at Helvetia-Rosemont is genetically related to the emplacement of several small early Tertiary quartz latite porphyry stocks (Drewes, 1972). Peach-Elgin, Copper World, Broadtop Butte and Rosemont and the marble deposit at the Santa Rita Quarry (Figure 66) appear to represent fault-bounded remnants of a single or possibly several porphyry copper systems. Following its formation approximately 56 million years ago (Ma), it was cut and dismembered by late Laramide (Eocene - 56-35 Ma) southwest-directed thrust (i. e., compressional) faulting (i. e., Santa Rita Thrust) and late Miocene (10-5 Ma) Basin and Range (i. e., extensional) faulting (Keith and Rasmussen, 2019).

Unraveling the complex structural geology is essential to understanding its impact on the distribution of the mineralization and alteration assemblages observed in the Helvetia-Rosemont Mining District. At the present time it is unclear how the pieces of the puzzle fit back together. However, there are several important spatial relationships that have been recognized. These relationships will assist efforts to evaluate the district's complex structural setting and benefit future exploration programs as they assess the economic potential of untested targets.

Copper mineralization at Peach-Elgin is genetically related to an early Tertiary quartz latite porphyry stock (K-Ar age – 56.3+1.7 Ma), which cuts Paleozoic carbonates in the upper plate of a flat-lying fault zone that is related to the late Laramide thrusting event (Figure 67). Strongly altered and mineralized Paleozoic carbonate sediments above this flat-lying fault zone host the copper mineralization at Peach-Elgin. The Precambrian granodiorite underlying this low angle fault zone is unmineralized and unaltered.

Copper mineralization at Copper World and Broadtop Butte is also restricted to the upper plate of this flat lying fault zone (Anzalone, 1995).

Also genetically related to a small late Tertiary quartz latite porphyry stock (not show in this east-west x-cross section), copper ores at Rosemont (Figure 68) are hosted by the Horquilla Limestone, Colina Limestone and Epitaph Formation. They are clearly restricted to the footwall of the same (?) late Laramide low-angle structure. Weakly mineralized and propylitically altered sediments (i. e., Willow Canyon Formation) in the hanging wall (i. e., upper plate) of this low-angle structure represent the outer fringes of a porphyry copper system.

In the northern portion of the district, marble deposits at the Santa Rita Quarry also represent an outer edge of a porphyry copper system.

Post World War II Economic Boom's Impact on the Copper Industry

During the nearly 3 decades that followed World War II (1945-1973), the United States experienced unparalleled economic growth fueled by pent-up consumer demand that followed years of hardship during Great Depression and the war (Moffatt, 2020). The increasing demand for copper and changes in U. S. government minerals policy during this period helped to stimulate exploration and development of the America's copper resources as well as expand the production capacity of existing mining operations.

Prior to World War II, there was relatively little stockpiling of strategic and critical minerals like copper. In response to shortages experienced during the war, Congress passed the Strategic and Critical Materials Stock Piling Act in 1946, with a goal of reducing U. S. dependence on foreign sources for supplies of strategic and critical minerals during a national emergency. However, few stockpile objectives had been met by the start of the Korean War in June 1950. In September 1950, Congress passed the Defense Production Act to rectify this situation. The goals of this assistance program were achieved by long-term market guarantees and changes in the tax code (i. e., accelerated tax amortization and increased depletion allowance) (Morgan, 1955). Projects taking advantage of this assistance program included Miami Copper's Copper

Cities Mine, Phelps Dodge's Bisbee East Mine (also known as the Lavender pit) and Asarco's Silver Bell Mine (Meyer and Greenspoon, 1954).

The Defense Production Act also established the Defense Minerals Administration in December 1950 (also known as the Defense Minerals Exploration Administration from November 1951 to September 1958, and Office of Minerals Exploration from September 1958 until 1974). This government agency provided financial assistance to private enterprise by funding exploration programs for minerals deemed strategic and critical to the national security (Anonymous, 2020a). Under this program, qualified projects received an exploration contract specifying location and extent of work to be performed, a set time frame in which the work was to be completed, estimated total exploration costs, and an amount to be funded by the U. S. Government (50% of total exploration cost for copper projects) (Anonymous, 2020b).

If ore was mined and sold during the term of the contract, the mine owner was obligated to repay the U. S. government its share of accumulated exploration costs at a fixed percentage of funds derived from the sale of the ore. If a significant discovery was made as a result of the exploration work, the mine owner was required to pay the U. S. Government a royalty (commonly 5% of net smelter return) on the proceeds received from the processed ore for a period of 10 years or until the U. S. Government's share of the exploration costs were repaid, whichever occurred first. If no discovery was made, the mine owner was not required to reimburse the U. S. Government's share of the exploration costs (Anonymous, 2020b).

During the 1950s, exploration projects at King-Exile and Peach-Elgin benefited from this government program. Applications for assistance from the operators of the Tip Top and Bulldozer mines were rejected by the Defense Minerals Administration.

Evaluation of Helvetia-Rosemont Copper Deposits since World War II

Post-World War II economic stimulation and advances in science and technology spurred the re-evaluation of the exploration potential in and around existing mining districts in southern Arizona, resulting in major discoveries in the Sierrita Mountains at Pima, Mission, and Twin Buttes in 1951, 1954 and 1956, respectively.

Harrison A. Schmitt (Figure 69) recognized the potential for a large, disseminated copper deposit in the Helvetia area as early as 1949 (Heyman, 1958). Despite potential metallurgical problems related to the nature of its mixed oxide-sulfide mineralization within a calcareous gangue, evaluation of the area's widespread copper potential began during the mid-1950s.

One of the first exploration efforts was a churn and diamond drilling program conducted by the Lewisohn Copper Corporation from late 1955 until April 1957, when exploration was terminated due to financial reasons (Emerick and Romslo, 1958). A portion of this project was partially funded by the Defense Minerals Exploration Administration, who issued a Certificate of Discovery in October 1958.

Examining an area located immediately northwest of the historic town site of Helvetia, this exploration drilling program successfully delineated a large zone of low-grade disseminated copper mineralization. Known as the Peach-Elgin deposit (Figure 70), this early discovery was estimated to contain a mixed oxide-sulfide resource of approximately 19.9 million tons, averaging 0.798% copper (Schmitt et. al., 1957).

The American Exploration and Mining Company explored the Ingersoll Breccia Pipe (Figure 71), located near the New Rosemont town site (Figure 66) southeast of Broadtop Butte during 1956, but failed to find economic concentrations of copper (Anzalone, 1995).

Discovery and Early Development of the Rosemont Deposit (1961-1972)

Incorporated in September 1935 by a group of Oklahoma and Texas oil men, the Banner Mining Company began mining operations at number of small mines, located south of Lordsburg, New Mexico in August 1936. Following the end of World War II, Banner's management realized if the company was going to survive it needed to expand its business to other mining districts that had potential for new discoveries. This led them to the Pima Mining District south of Tucson, where they acquired the Twin Buttes property and Mineral Hill Mine in 1950 (Bowman, 1963). Both of these properties were subsequently

placed in production; Mineral Hill in May 1954 and Twin Buttes in November 1969.

Intrigued by the occurrence of widespread copper mineralization in the Helvetia-Rosemont Mining District, Allan Bowman, general manager of the Banner Mining Company, intermittently visited the area beginning in 1949 (Figure 72). These examinations ultimately led to Banner's acquisition in May 1961 of a large land package through four basic agreements, which included extensive land holdings controlled by the Lewisohn estate (Bowman, 1963). Banner Mining Company acquired a lease on the Narragansett property in July 1963.

Soon after its acquisition of the Helvetia-Rosemont property in May 1961, Banner Mining Company commenced an exploration drilling program that resulted in the discovery of the Rosemont deposit. The discovery drill hole (G-33) contained a 1,000-foot intercept that assayed more than 0.9% copper (Anzalone, 1995).

By the end of 1963, this exploration program completed 16,541 feet of diamond and rotary drilling in the Helvetia-Rosemont Mining District, which included three diamond drill holes, totaling 4,300 feet at the Rosemont discovery (Meagher, 2017).

The Anaconda Company acquired an option to lease Banner's Arizona holdings in March 1963. This included mining properties in the Pima and Helvetia-Rosemont mining districts. Anaconda exercised its option in April 1964, initiating a 60-year lease (Amax, 1973).

Over the next 10 years, Anaconda geologists prepared detailed geological maps of the area and carried out extensive diamond drilling programs on the Peach-Elgin and Rosemont deposits. These studies included 113 diamond drill holes, totaling 136,838 feet at the Rosemont deposit (Meagher, 2017).

Anaconda purchased the Hidden Valley Ranch property in March 1971. They also initiated a process to acquire title to Forest Service lands to facilitate future development of the Helvetia-Rosemont Mining District.

Anamax Mining Company (1973-1988)

In January 1973, a 50/50 partnership, known as the Anamax Mining Company, was formed by the Anaconda Company and Amax, Inc. to manage their holdings in southern Arizona. Amax, Inc. subsequently acquired the underlying ownership interest in these properties through its merger with the Banner Mining Company in June 1973 (Amax, 1974).

Anamax developed plans to place Helvetia-Rosemont in production during the mid- to late 1970s. These efforts included Anamax's purchase of the 47,500 acre Empire Ranch (Figure 73) in December 1974 for $12.8 million (Drescher, 1979). Anamax also acquired the Santa Rita Marble Quarry property from the Home-Stake Production Company in 1975 for its exploration potential. In January 1977, Anamax purchased the 27,500 acre Cienega Ranch for $1.4 million, chiefly for its water rights. By the early 1980s, Anamax's Helvetia-Rosemont property holdings totaled nearly 103,000 acres (Figure 74).

Anamax's plan of operation for the open pit at Rosemont (also known as Helvetia East) called for a 33,000 short ton per day conventional flotation concentrator to treat a sulfide reserve of approximately 337 million short tons, averaging 0.54% copper. A 4,100 short ton per day oxide treatment plant, similar to their existing oxide facility at Twin Buttes, would process 22 million short tons oxide ore, averaging 0.55% copper. Total estimated water usage by this operation was 19,000 acre feet per year. State-owned lands along North Canyon were also leased for use as a conventional tailings pond. The copper concentrate product was planned to be hauled by truck to a rail loading facility near Vail for shipment to the San Manuel smelter. Estimated capital cost of the Rosemont project was $241.6 million (Drescher, 1979).

A second 2,650 short ton per day conventional flotation concentrator at Peach-Elgin (also known as West Helvetia) was planned to treat ores from a small satellite pit, containing 13.5 million tons of sulfide ore, averaging 0.78% copper. No provisions were made to treat 10 million tons of oxide material, averaging 0.72% copper, which would be stockpiled. The estimated capital cost of the Peach-Elgin project was approximately $17.4 million (West, 1980).

<u>Liquidation of Anamax's Holdings (1985-1988)</u>
In November 1985, Anamax ceased all operations and permanently closed its Twin Buttes operation at

Green Valley (Amax, Inc., 1986). This resulted in the subsequent liquidation of its assets in the Helvetia-Rosemont Mining District.

In December 1986, Calcium Products of Arizona purchased the Santa Rita Marble Quarry from Anamax.

The Pioneer Trust Company and Dennis Lauderbach purchased the Helvetia-Rosemont Mine property for $800,000 in January 1987 (Walenga, 1987).

Anamax's Greaterville property was purchased by a Phoenix real estate investment group for $3.6 million in May 1987 (Walenga, 1987).

Pima County tried to acquire the Empire and Cienega ranch properties along with their state grazing leases for future recreational development. However this attempt ultimately failed after it became mired in politics and money problems (Anonymous, 1988).

In June 1988, the Empire and Cienega ranch properties were transferred to the public domain through a three-way land exchange involving Anamax, Seven West Properties and the Bureau of Land Management (BLM). Under the terms of this transaction, Seven West Properties purchased the Empire and Cienega ranch properties from Anamax, and traded them to the BLM for federal lands of equal value in the Phoenix area that were suitable for commercial real estate development (Anonymous, 1988).

Initially designated the Empire-Cienega Resource Conservation Area, it ultimately became a part of the Las Cienegas National Conservation Area in December 2000 (Figure 75).

ASARCO, Inc. (1988-2004)

In August 1988, ASARCO, Inc. purchased the Helvetia-Rosemont property for $1 million in cash, 1,200 acres of non-mineral lands in Avra Valley, and a 3% net smelter return royalty on future production (Walenga, 1988).

Over the next several years, ASARCO evaluated their mineral holdings in the Helvetia-Rosemont Mining District and began drawing up plans for future mining operations at Rosemont. By 1995, they initiated a process to acquire title to the Forest Service lands required to facilitate the potential development of this mineral resource. This effort involved exchanging 2,222 acres of privately owned parcels within the national forests of Arizona with an appraised value of $5.3 million for 13,272 acres of Forest Service lands in the Rosemont area, which had an appraised value of $5.1 million (ASARCO, Inc., 1997).

In December 1995, ASARCO succeeded in acquiring patents on 21 mining claims, covering 347 acres in the Rosemont area (Anonymous, 1995). These were among the last mining claims to be patented in the United States, since U. S. Congress imposed a moratorium on the processing of mineral patent applications on October 1, 1994 (Figure 76). With patented mining claims now covering much of the known ore body at Rosemont, its potential for future development was greatly enhanced.

In February 1998, ASARCO suspended its efforts to get a land exchange in response to the falling price of copper, which had declined from an average of $1.395 per pound in July 1995 to $0.755 per pound in February 1998 (Anonymous, 1998).

Grupo Mexico acquired the Helvetia-Rosemont property through its merger with ASARCO, Inc. in November 1999 (Grupo Mexico, S. A. de C. V., 2000). They continued to hold this property until June 2004, when it was sold to Triangle Ventures LLC.

Over the 16-year period, the Helvetia-Rosemont property was held by ASARCO and its successor Grupo Mexico 11 additional diamond drill holes were completed at Rosemont, totaling 14,695 feet (Meagher, 2017).

Augusta Resource Corporation (2005-2014)

Triangle Ventures LLC purchased the Helvetia-Rosemont property from ASARCO for $4.8 million in June 2004. In December 2004, they offered to sell it to Pima County for $11.5 million so it could be preserved as open space (Davis, 2005). After negotiations with Pima County failed, Triangle Ventures sold the Helvetia-Rosemont property to the Augusta Resource Corporation in April 2005 for $20.8 million (Augusta Resource Corporation, 2006a).

After purchasing the Helvetia-Rosemont property, Augusta Resource commenced an in-fill drilling program (Figure 77) to bring the resource estimate at

Rosemont into compliance with National Instrument 43-101 standards set forth by Canadian securities regulators.

This comprehensive program was designed to better define the geology and distribution of copper mineralization at Rosemont, as well as gather geotechnical data required to design the proposed pit and site facilities. It also included a re-examination of the historical drill core from previous drilling campaigns at the site.

In June 2006, Washington Group International completed a preliminary assessment and economic evaluation of the Rosemont Copper project (Augusta Resource Corporation, 2006b). Augusta Resource submitted its initial plan of operation to the U. S. Forest Service in August 2006 (Augusta Resource Corporation, 2006c). However, this plan was subsequently deemed incomplete and returned for further work.

In April 2007, Rosemont Copper began a 7-year $377,000, 3-phase study through a research grant with the University of Arizona to evaluate reclamation techniques for transforming disturbed mine lands into properly functioning ecosystems (Anonymous, 2009). Initial phases of this study were conducted in greenhouses simulating three different rainfall scenarios, 3 soil types, and 3 soil/surface amendments (CDM Smith, 2012). The final phase of this research evaluated the established native species seed mix under real-world conditions at two field test sites (Figure 78) located at Rosemont Copper's property in the Santa Rita Mountains (Lawson, H., 2009).

Augusta Resource resubmitted a revised plan of operation to the U. S. Forest Service in July 2007. M3 Engineering completed a positive feasibility study on the Rosemont copper project in August 2007 (Augusta Resource Corporation, 2007). The Forest Service accepted Augusta Resource's revised plan in March 2008 and commenced the process of evaluating this proposal under guidelines set forth in the National Environmental Protection Act of 1969.

In August 2007, ASARCO filed a lawsuit, seeking the return of the Helvetia-Rosemont property or the recovery of the lost value in its sale to Triangle Ventures LLC. This litigation for fraudulent conveyance was settled in January 2009, ultimately resulting in payments of $2.93 million from Augusta Resource and $1.0 million from Triangle Ventures to ASARCO (Augusta Resource Corporation, 2011a).

In September 2010, Augusta Resource entered into a joint venture agreement with a Korean consortium, comprising the Korea Resources Corporation and LG International Corporation. This agreement allowed Augusta Resource to reduce its risks in this undertaking by allowing its joint venture partners to earn up to a 20% interest in the Rosemont property in consideration for funding US $176 million of the project expenses (Augusta Resource Corporation, 2011a).

In September 2010, Rosemont Copper awarded grants of $100,000 each to five solar-power companies to test alternative energy systems for its proposed mining project (Figure 79). Placed on-line in September 2011, this 90-kilowatt test facility was monitored by the University of Arizona Research Institute for Solar Energy (Wichner, 2011).

After 3.5 years of study, the Coronado National Forest released a Draft Environmental Impact Statement on the Rosemont Copper project in October 2011 and commenced public hearings. The public comment period ended in January 2012 (Augusta Resource Corporation, 2011b).

Rosemont Copper received its Aquifer Protection and Air Quality permits from the Arizona Department of Environmental Quality in April 2012 and January 2013, respectively (Augusta Resource Corporation, 2014).

After nearly 2 years of additional study, the Coronado National Forest published the Final Environmental Impact Statement of the Rosemont copper project on November 29, 2013 (Augusta Resource Corporation, 2013a). The Draft Record of Decision was officially released on December 13, 2013 (Augusta Resource Corporation, 2013b).

Hudbay Minerals, Inc. (2014-Present)

Hudbay Minerals acquired the Helvetia-Rosemont property through its $555 million (Canadian dollars) merger with Augusta Resource Corporation in September 2014 (Hudbay Minerals, Inc., 2014).

Over the next 2 years, Hudbay Minerals completed an in-fill drilling program at Rosemont, which included 90 additional diamond drill holes, totaling 168,286 feet. Based on the results of this and other studies, Hudbay Minerals completed a positive feasibility study for the $1.92 billion Rosemont project in March 2017 (Meagher, 2017).

To date, exploration drilling at Rosemont (1961-2015) included 356 diamond drill holes, totaling 510,952 feet (Table 2). Published proven and probable reserves (2017) totaled 592,033,000 short tons, averaging 0.45% copper, 0.012% molybdenum and 0.13 oz. of silver per ton (Meagher, 2017).

Table 2. Summary of Rosemont drilling campaigns (Meagher 2017).

Company	Period	No. of Drill Holes	Footage
Banner	1961-1963	3	4,300
Anaconda	1963-1972	113	136,838
Anamax	1973-1986	52	54,350
ASARCO	1988-2004	11	14,695
Augusta Resource	2005-2012	87	132,483
Hudbay Minerals	2014-2015	90	168,286
Total	1961-2015	356	510,952

The U. S. Forest Service issued the Final Record of Decision, approving the Rosemont copper project on June 7, 2017. This concluded a thorough process involving 17 co-operating agencies at various levels of government, 16 hearings, more than 1,000 studies, and 245 days of public comment that yielded more than 36,000 comments (Hudbay Minerals, Inc., 2017). Hudbay Minerals submitted a Draft Mine Plan of Operation with the U. S. Forest Service shortly thereafter.

After navigating through a regulatory permitting process for 11 years, the final approval (Clean Water Act 404 Water Permit) required for the Rosemont Copper project was issued by the U. S. Army Corps of Engineers on March 8, 2019 (Hudbay Minerals, Inc., 2019a). Since Augusta Resource Corporation acquired the Rosemont property in April 2005, development and permitting costs have exceeded $300 million, without producing a single pound of copper (compiled from Augusta Resource Corporation and Hudbay Minerals, Inc. quarterly reports).

Hudbay Minerals reacquired the 7.95% minority interest in the Rosemont copper project from United Copper & Moly, LLC on March 13, 2019. Under the terms of this agreement, Hudbay Minerals purchased the minority interest in the Rosemont project for $45 million in cash plus three annual installments of $10 million, commencing on July 1, 2022 (Hudbay Minerals, Inc., 2019b).

The U. S. Forest Service approved the Rosemont Mine Plan of Operation on March 21, 2019 (Hudbay Minerals, Inc., 2019c). This open pit operation is designed to minimize environmental and ecological impacts through the use of proven technologies and innovative mining and reclamation practices (Figure 80). The ores will be processed by a 75,000 short ton per day flotation concentrator, which will employ a dry stack tailings disposal system that enables much of the water (85%) that would normally remain in a conventional tailings impoundment to be recycled by the ore treatment facility. A secondary benefit of using this system eliminates the need for a large tailing impoundment, which significantly reduces the operation's areal footprint. Innovative mining practices will allow reclamation to commence at startup and continue throughout the life of the project.

Evolving Challenges

Arizona has changed dramatically since the Helvetia Copper Company commenced operations at the turn of the 20th century. In 1900, Arizona had a population of 122,931 of which only 14,689 resided in Pima County (Twelfth Decennial Census of the United States, 1900). At that time, mining, ranching, farming, and timber industries were the mainstay of Arizona's economy.

Advances in technology and innovative mining practices over the last century have made mineral deposits that were once unprofitable to mine into viable business ventures today. However, since the late 1940s, Arizona's rapid population growth (Figure 81), diversification of its economic base, and passage

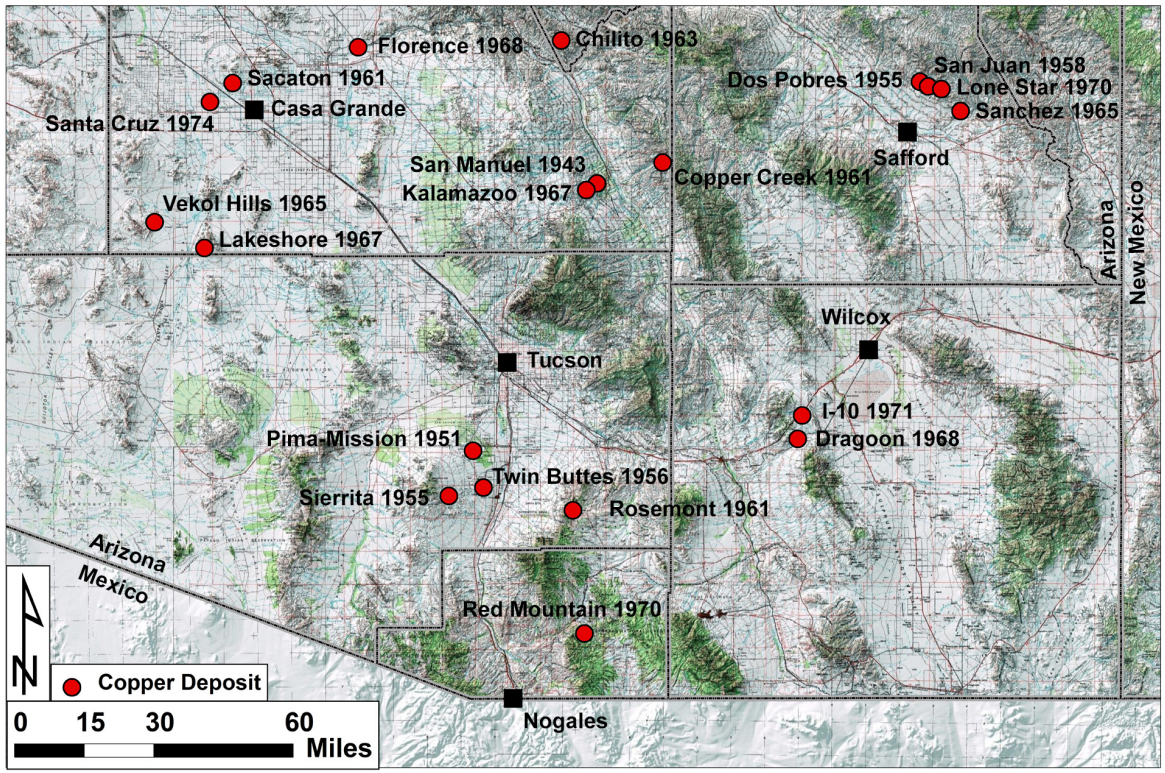


Figure 60. Major copper discoveries in southeastern Arizona during 1940-1975.

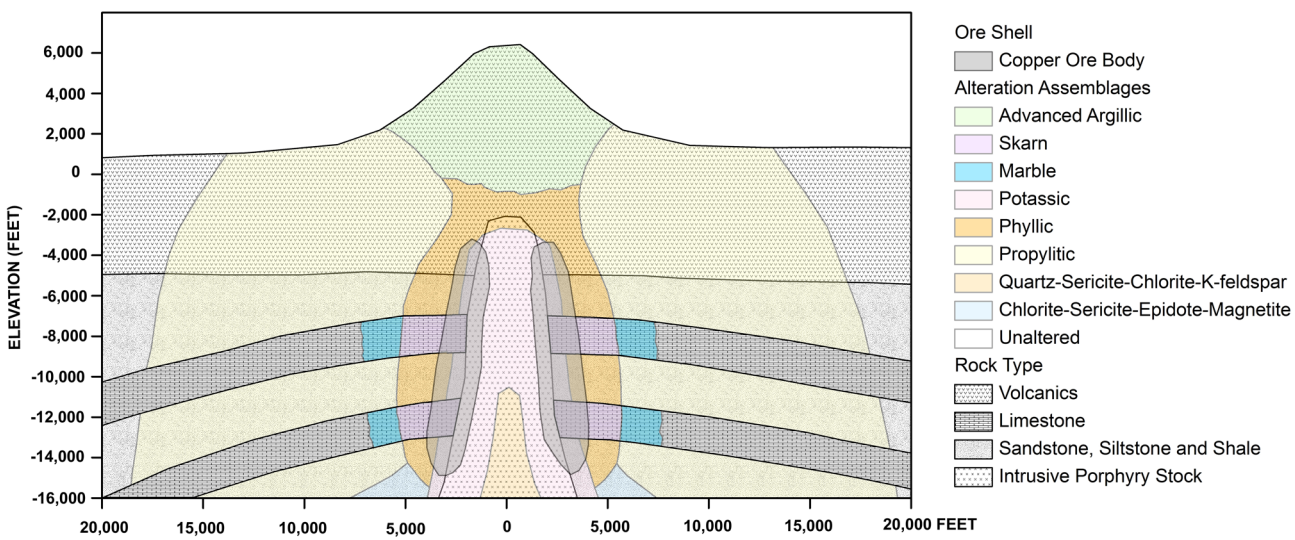


Figure 61. Simplified cross-section through a typical porphyry copper system, showing the distribution of the ore and alteration assemblages (Modified from Lowell and Gilbert, 1970).

Figure 62. Porphyry with quartz and plagioclase feldspar phenocrysts and quartz-orthoclase veining at the Rosemont deposit. Some of the plagioclase phenocrysts appear pale greenish-blue as a result of the substitution of secondary clay minerals by copper minerals such as chrysocolla (Jan Rasmussen, Sept.

Figure 63. Green propylitic alteration with calcite veining in andesitic volcanics at the Rosemont deposit (Photo by Jan Rasmussen, September 2012). lower left

Figure 64. Serpentine-magnetite skarn in Epitaph Formation at the Rosemont deposit (Photo from Augusta Resource Corporation, February 2012). center

Figure 65. Strong bornite mineralization in Horquilla Limestone at the Rosemont deposit (Photo from Augusta Resource Corporation, March 2006). lower right

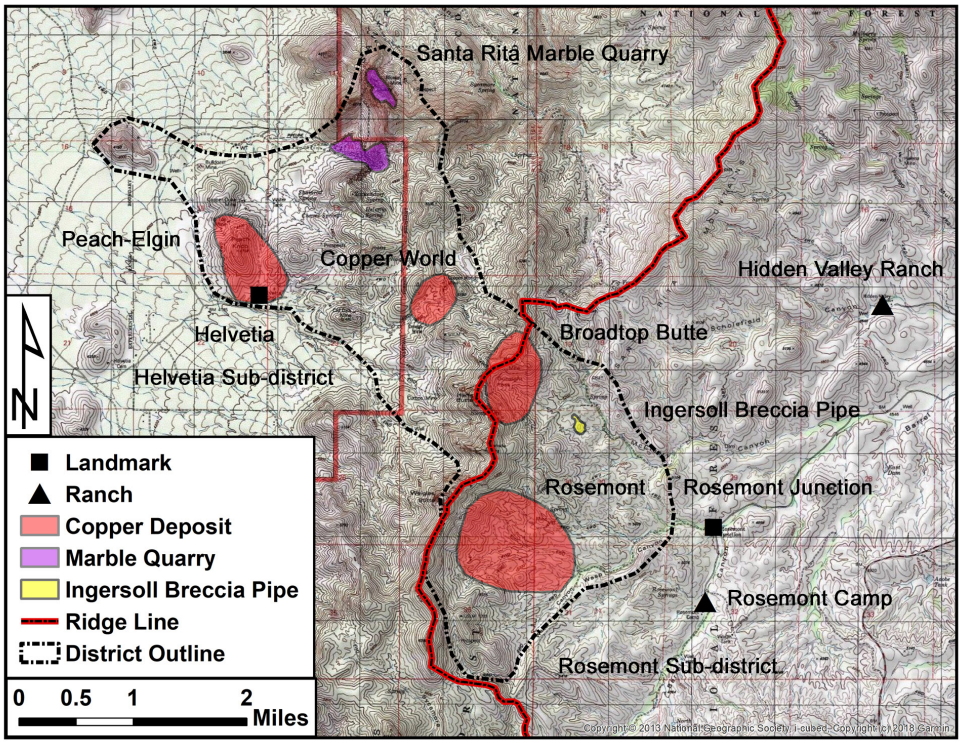


Figure 66. Disseminated copper deposits of the Helvetia-Rosemont Mining District (Modified from Anzalone, 1995).

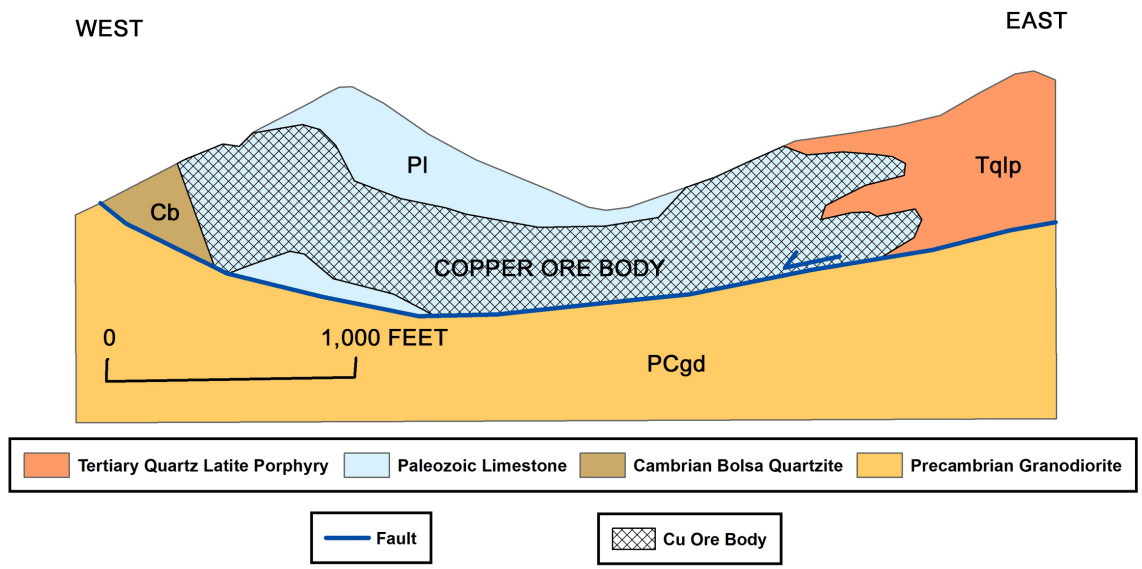


Figure 67. Schematic east-west cross-section of the Peach-Elgin Deposit (Modified from Anzalone, 1995).

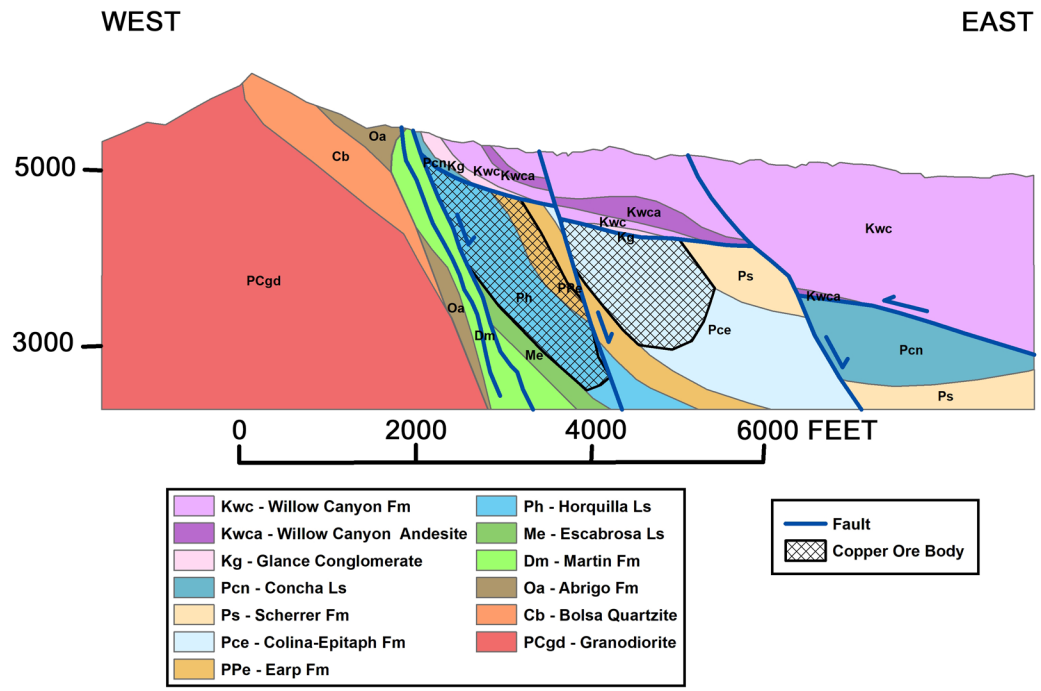


Figure 68. Schematic east-west cross-section of the Rosemont Deposit (Modified from Meagher, 2017).

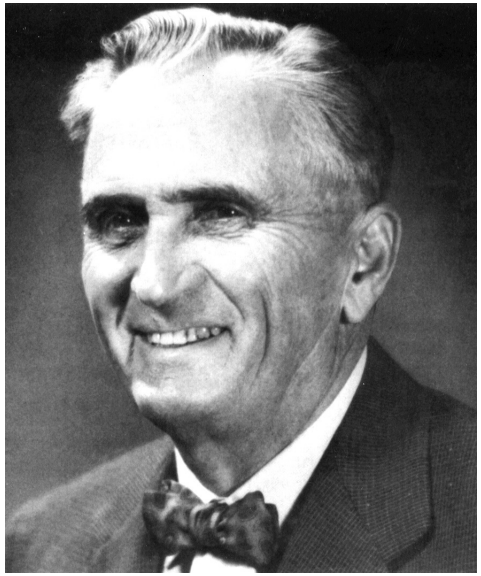


Figure 69. Harrison A. Schmitt (1896-1966) recognized the potential for a large disseminated copper deposit at Peach-Elgin in 1949. An interesting side note; Harrison Schmitt's son, Harrison H. Schmitt is also a geologist and an astronaut on the Apollo 17 mission to the moon in December 1972 (Mining Foundation of the Southwest).

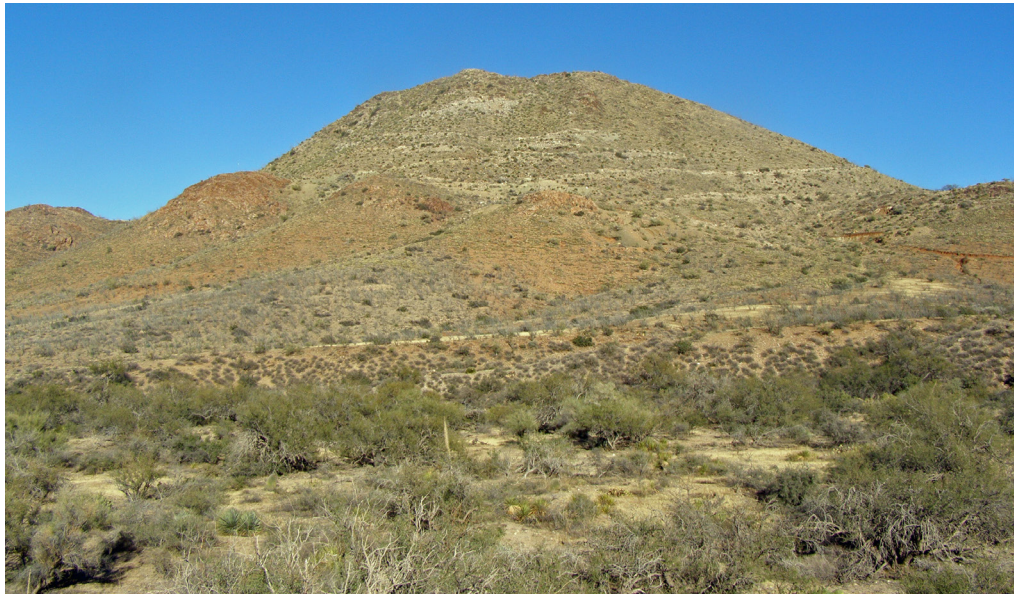


Figure 70. Drill roads at the Peach-Elgin deposit in the Helvetia Sub-district, looking north (Photo by David Briggs, December 2013).

Figure 71. The Ingersoll Breccia Pipe is represented by the dark reddish, hematite-stained outcrop in foreground. Composed of strongly broken fragments of hydrothermally altered rock, these features are commonly associated with porphyry copper systems (Photo by David Briggs, March 2007).

Figure 72. Allan Bowman (1911-1982), general manager of the Banner Mining Company is credited with the discovery of the Rosemont porphyry copper deposit (Photo from Mining Foundation of the Southwest). below

Figure 73. Anamax acquired Empire Ranch in December 1974, primarily for its water rights (Photo from Chorover et. al., 2016).

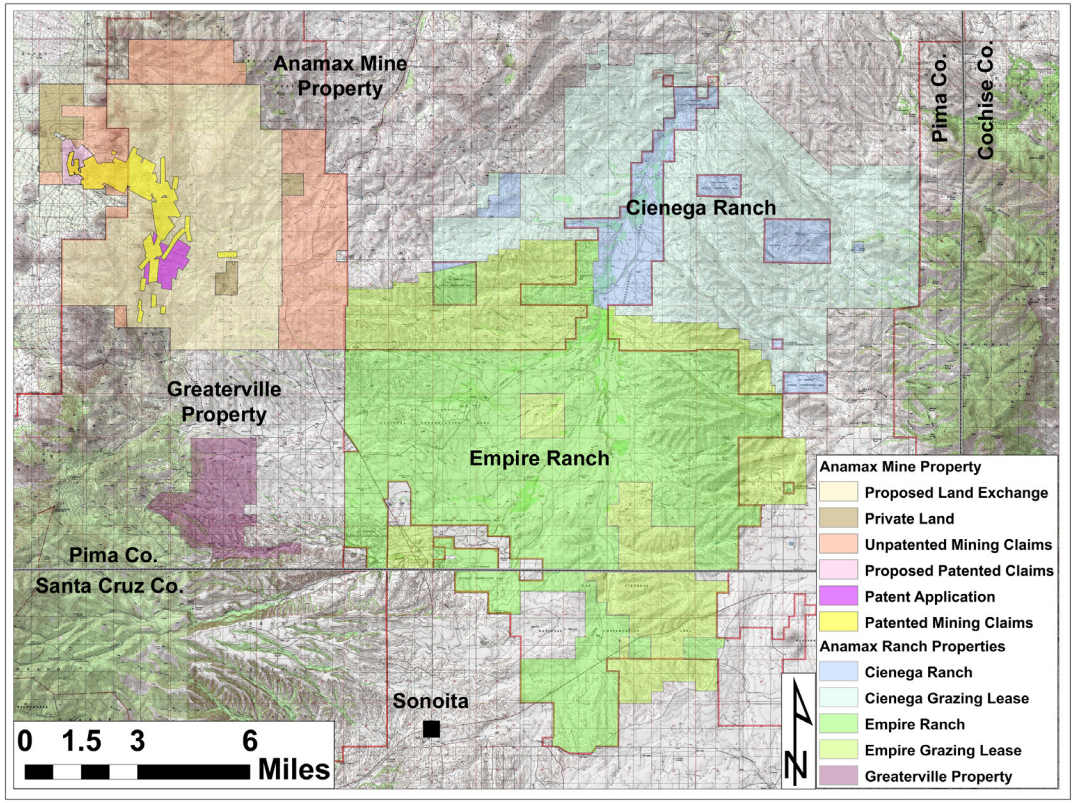


Figure 74. Anamax land holdings included 41,886 acres of private property, 1,671 acres of patented mining claims, 20,820 acres of unpatented mining claims, and 38,575 acres of state and federal grazing leases (Modified from Anamax Mining Company, 1984).

Figure 75. Las Cienegas National Conservation Area was created in December 2000 (Photo by Stan Keith, July 2019).

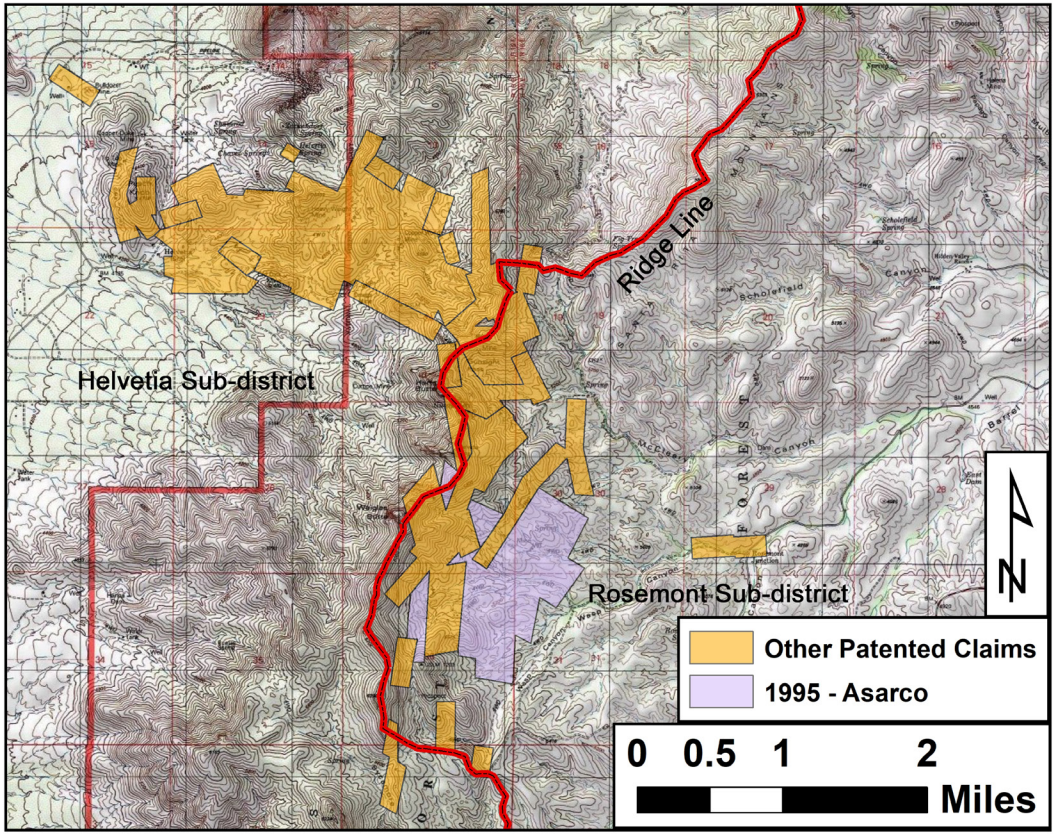


Figure 76. Patented mining claims (1995) in the Helvetia-Rosemont Mining District (Prepared from Bureau of Land Management records).

Figure 77. Diamond drill rig at Rosemont (Photo by David Briggs, January 2007).

Figure 78. Reclamation test plot at the Hidden Valley Ranch (Photo by Jan Rasmussen, September 2012).

Figure 79. Core storage building and solar energy test site at the Hidden Valley Ranch (looking northeast) (Photo by William Peachey, September 2012).

Figure 80. Panoramic photo showing approximate perimeter for the proposed open pit mine at Rosemont (looking west) (Photo by David Briggs, August 2008).

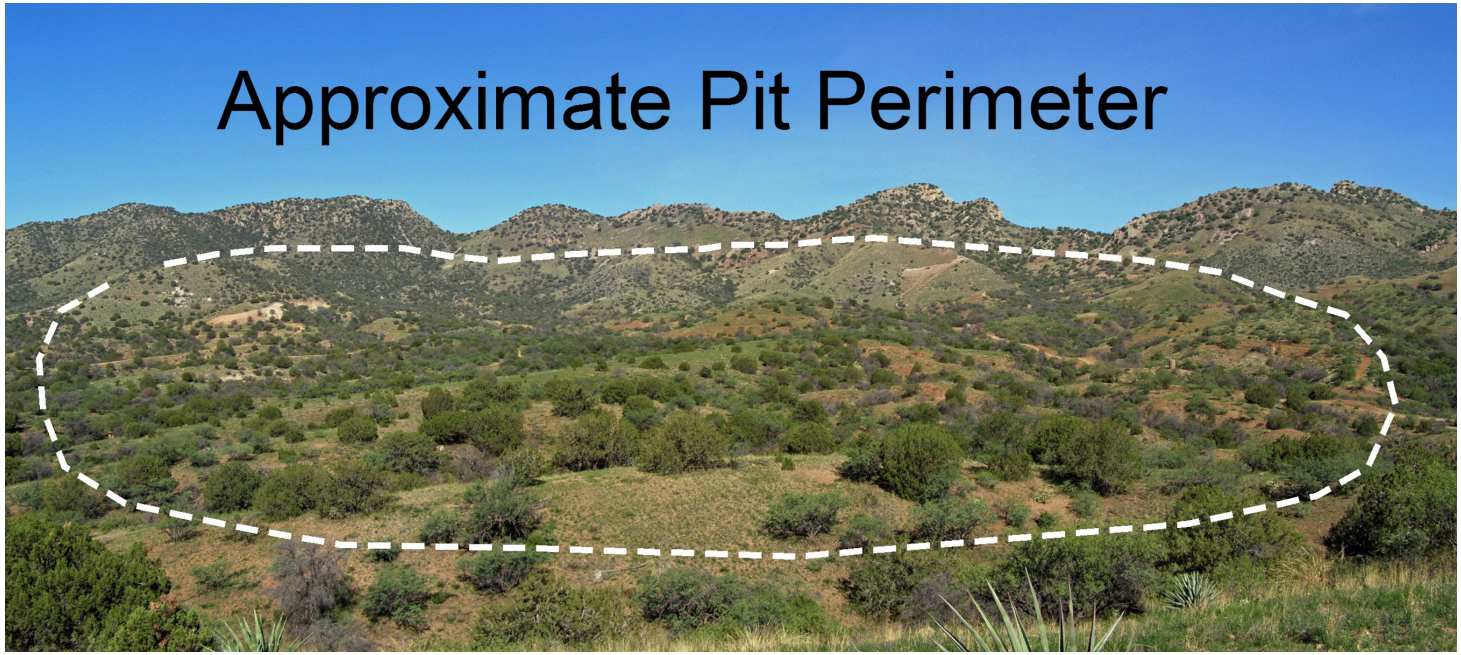
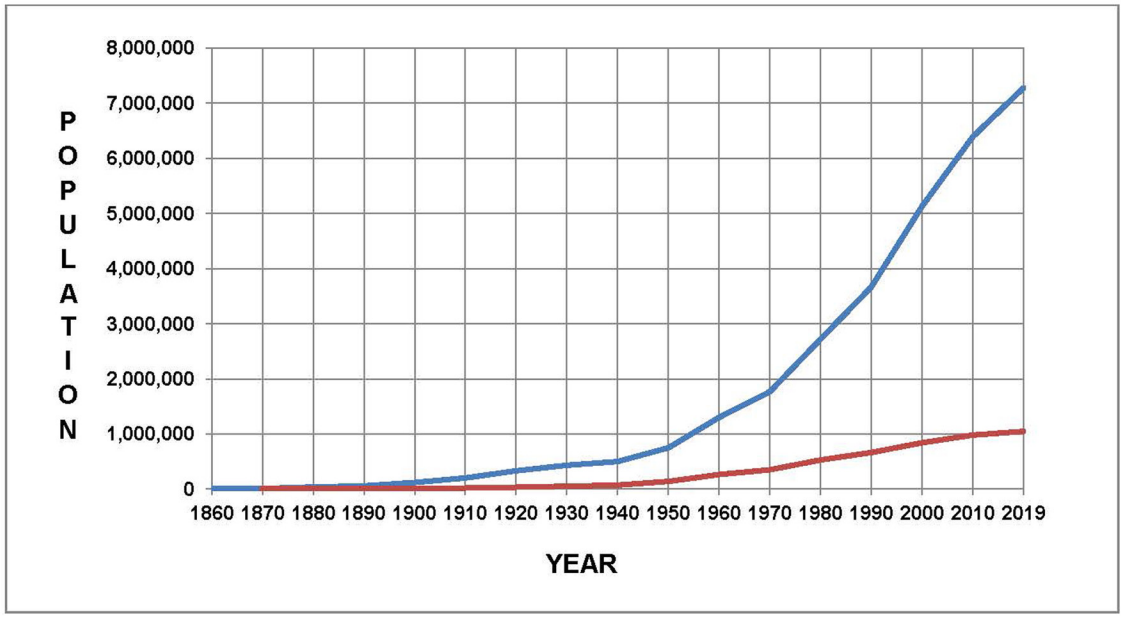


Figure 81. Population of Arizona (blue curve) and Pima County (red curve) from 1860 until 2019 (Data from U. S. Census Bureau).



of environmental legislation have created additional challenges to meeting the nation's growing demand for mineral resources.

By 1940, Arizona's population had grown to 499,261 of which 72,838 resided in Pima County (Sixteenth Decennial Census of the United States, 1940). Arizona's estimated population was 7.3 million in 2019 of which more than 1 million resided in Pima County.

Since the late 1940's Arizona's economic base has shifted from the production of renewable and non-renewable natural resources to the manufacturing, construction and service sectors of the economy. This transition was accompanied by increased competition for the region's finite land, water and other natural resources.

The first environmental legislation was passed during the late 1960s. Since that time, the mining industry has had to comply with increasingly complex federal, state and local regulatory hurdles before production can proceed. The cost of compliance in both time and expense has become a factor in deciding whether to proceed with a domestic project or investing its limited financial resources abroad. These choices impact America's ability to supply its needs from domestic resources.

The withdrawal of large tracts of land from mineral development under the Wilderness Act of 1964 and Antiquities Act of 1906 have significantly reduced opportunities to assess mineral potential of public lands (Briggs, 2017). Bureau of Land Management, U. S. Forest Service, Fish and Wildlife Service, and National Park Service records show 10.1 million acres or 36.4% of the federal land in Arizona (excluding Department of Defense land) has been withdrawn from mining. Efforts by local governments to preserve open space and uncontrolled development in rural areas bordering urban centers (i. e. urban sprawl) also threaten pre-mature condemnation of favorable exploration targets. Today's challenge is finding ways to responsibly extract the mineral wealth from lands that remain open to development.

Participation by industry, government, and other stakeholders in today's permitting process have helped meet the nation's demand for minerals from domestic sources, while minimizing impacts these large projects have on neighboring communities. However, responsible efforts to develop our domestic mineral resources are often opposed by special interest groups for environmental, economic and other reasons. The Rosemont Copper project has not been an exception to this rule (Figure 82).

In response to litigation filed in U. S. District Court, Judge James Soto granted a summary judgment in favor of Rosemont Copper's opponents on July 31, 2019. Basing this decision solely on the legality of Rosemont Copper's unpatented mining claims, he ruled the U. S. Forest Service erred when it chose the sites for mine waste and mill tailings disposal without first considering their validity. In declaring these claims invalid under the General Mining Law of 1872, Judge Soto ruled they could not be used for mine waste and mill tailings disposal. As a result of this decision, the U. S. Forest Service's Record of Decision (ROD) and Final Environmental Impact Statement (FEIS) were vacated and remanded, indefinitely delaying all efforts to proceed with the project (Soto, 2019).

Significance and Potential Impacts of Rosemont Ruling

Judge Soto's ruling reversed nearly 150 years of legal precedent in the application of our nation's mining laws. While claim holders' right to extract minerals from valid unpatented mining claims was upheld, restrictions imposed by this ruling on the use of surface resources to further their development make it impossible to do so. This was clearly not the legislative intent of the General Mining Law of 1872 or any of its subsequent revisions (Harker, 2019).

If upheld on appeal, Judge Soto's ruling will have far-reaching national repercussions that will negatively impact both present and future mining operations on public lands throughout the United States. In obstructing our ability to supply our needs from domestic sources, this ruling runs counter to the U. S. government's policy of minimizing our dependence on foreign sources for supplies of strategic and critical minerals that was established after World War II.

Increasing our dependence on imported goods will make America's economic and national security more vulnerable to decisions made by foreign governments (Harker, 2019).

Epilogue

Mining at Helvetia-Rosemont has always been challenging. Technology and mining practices of the early 1900s were poorly suited to exploit mineralization encountered at Helvetia-Rosemont. In spite of these handicaps and other difficulties, our forefathers developed the district's resources to help meet America's growing demand for copper. When the higher grade, more amenable ore bodies were exhausted, the mines were closed, mining camps abandoned and workers found employment elsewhere.

Figure 82. Efforts to develop copper deposits in the Helvetia-Rosemont Mining District have been opposed by various special interest groups (Photo by David Briggs, May 2008).

Since the discovery of the Rosemont deposit in 1961, three attempts have been made to resume production in the Helvetia-Rosemont Mining District. Anamax's initial attempt failed in November 1985, following a prolonged decline in the price of copper during the early 1980s. ASARCO suspended its efforts in February 1998 for a similar reason. The most recent attempt to resume production at Helvetia-Rosemont began in April 2005 with Augusta Resource's purchase of the property. After nearly 14 years of hard work and considerable expense, the final permit required to commence operations at Rosemont was approved in March 2019. However, this approval was short-lived. In late July 2019, a U. S. District Court ruling indefinitely halted Hudbay Minerals' efforts to commence development.

A victim of competing visions of Arizona's future, efforts to resume production in the Helvetia-Rosemont remain on hold as appeals work their way through the courts. Only time will tell, whether the Helvetia-Rosemont Mining District remains Arizona's hardscrabble mining camp or assumes its hard-earned place as one of America's largest copper producers.

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In October 2019, I made an oral presentation on the History of the Helvetia-Rosemont Mining District (1875-1961) to the La Frontera Corral of the Westerners in Green Valley, Arizona. During the course of preparing this talk, I realized there was much information on the Helvetia-Rosemont Mining District that was not covered in my original article, which was published by the Arizona Geological Survey in June 2014 (Briggs, 2014). After a little coaxing from my friend, Jan Rasmussen and others, I commenced work on this article.

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many of the photos contained within this article. These photos provide an opportunity to get to know some of the men and women, who played a role in Helvetia-Rosemont's history and help to illustrate what is described in the text.

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