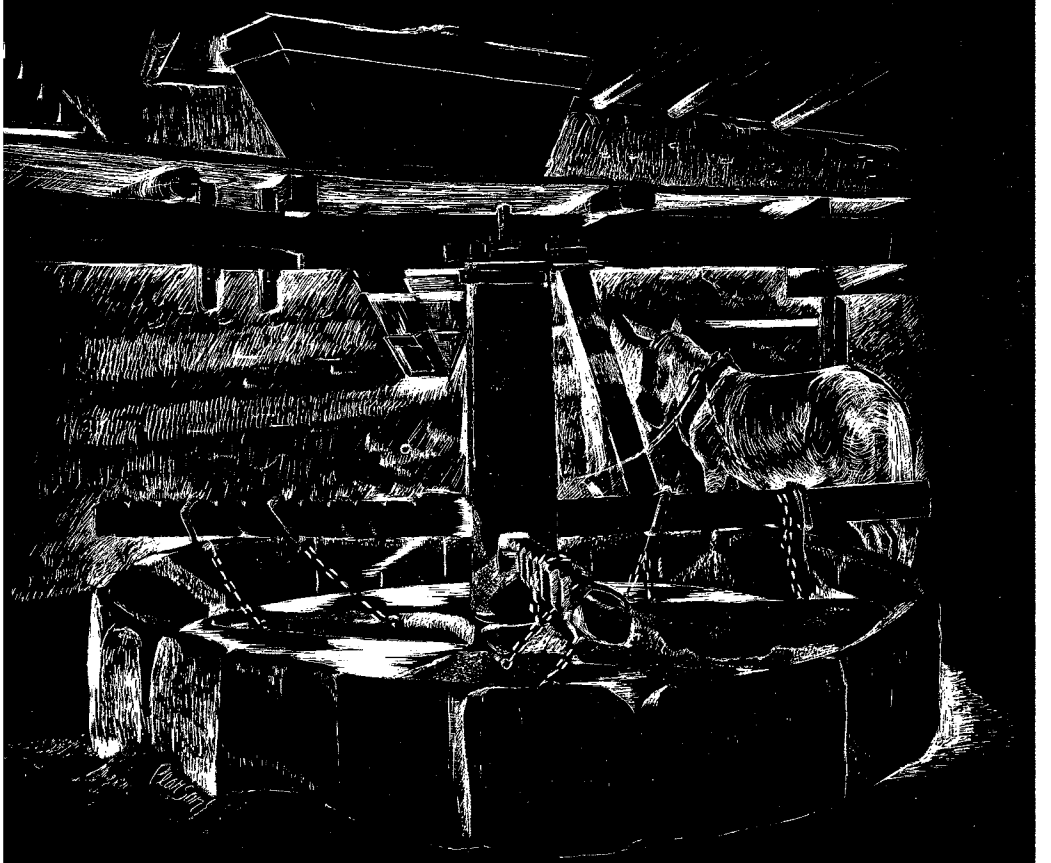
THE STORY OF MINING IN NEW MEXICO



THE ARRASTRA: ONE OF THE MOST FAMOUS TECHNICAL DEVICES UTILIZED BY MINERS IN NEW MEXICO DURING THE SPANISH PERIOD AND MOST OF THE 19TH CENTURY. THE ARRASTRA WAS USED TO GRIND AND AMALGAMATE FREE-MILLING GOLD AND SILVER ORES, OR TO GRIND VARIOUS ORES FOR REDUCTION IN FURNACES.

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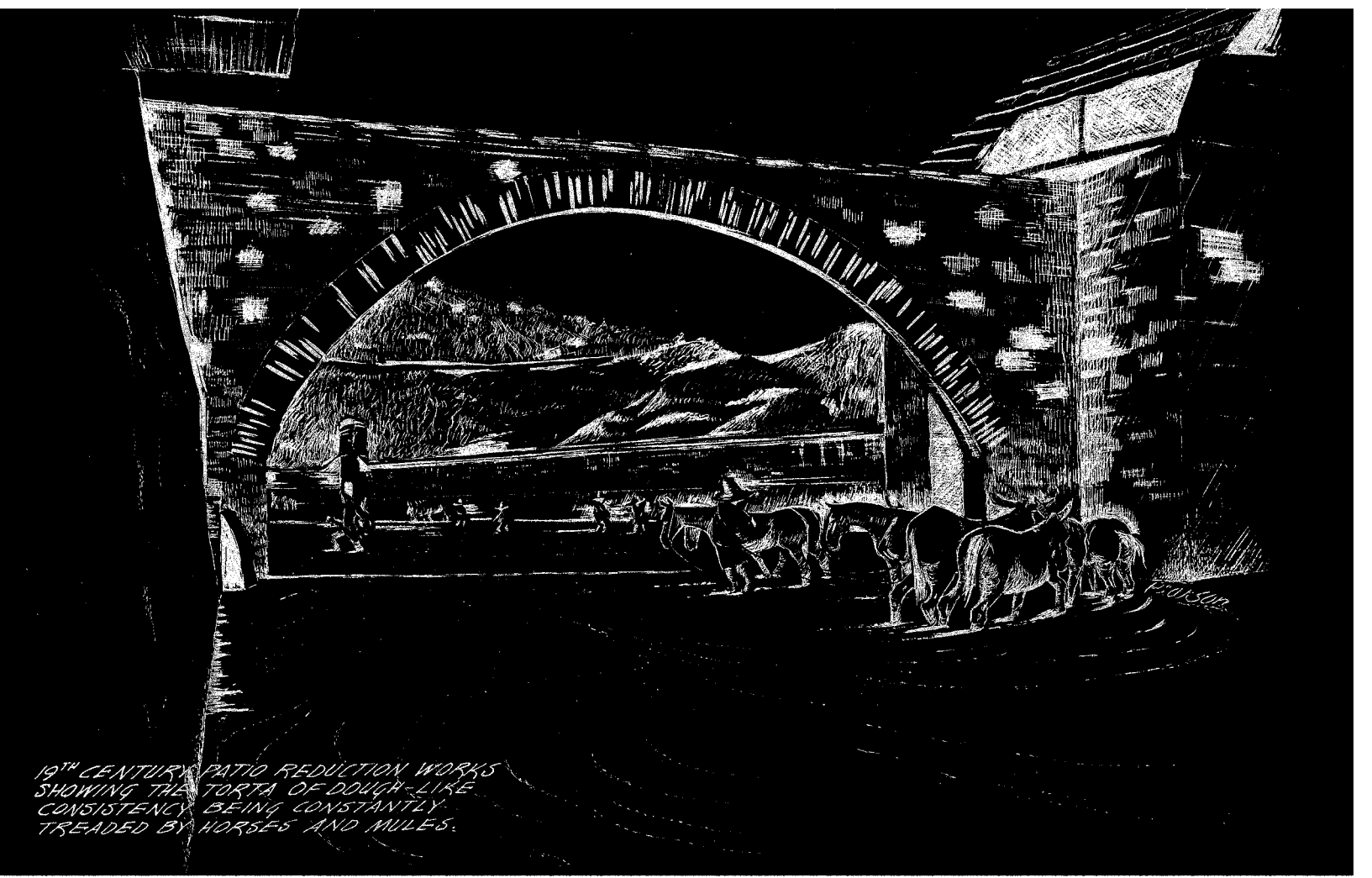
The wealth of the world will be found in New Mexico and Arizona.

–Baron von Humboldt, 1803
Political Essay on New Spain



19TH CENTURY PATIO REDUCTION WORKS SHOWING THE TORTA OF DOUGH-LIKE CONSISTENCY BEING CONSTANTLY TREADED BY HORSES AND MULES.

Scenic Trips to the Geologic Past
No. 12

New Mexico Bureau of Mines & Mineral Resources

A DIVISION OF
NEW MEXICO INSTITUTE OF MINING & TECHNOLOGY

The Story of Mining in New Mexico

by PAIGE W. CHRISTIANSEN

Illustrated by Neila M. Pearson

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Prologue

A salient fact stands out in the broadly romantic and always exciting history of New Mexico, and that fact is clear and sure: mineral resources and mining, at every level and in every period, are central to the theme and story. A persistent theme, one that transcends Indian, Spaniard and American, and seems to grow in strength and vitality with passage of time, it shows up in legends and folklore, and in a small degree, gave the Indians of New Mexico and the Southwest a unique position in trade with other Indians. It laid the foundation for the exploration and conquest of New Mexico, was the basis for a continuing dream of wealth in the minds of the Spanish, and has been a constant and vital theme during the century and a half of American occupation in New Mexico.

The story has many facets. There is a naturalness and simplicity in the Indian story. The Spanish period smacks of legend rather than reality; of constant search and constant frustration amid a mixture of religion, limited technology and stubborn courage. Yet with all the searching, the hope, the sureness that somewhere near was the outcrop that spelled glory in the service of Catholic Spain, little or nothing of value was found. Change came quickly in the 19th century as the westward movement of the American people swept across New Mexico. Again the theme came alive; with more of all things needed to make the search exciting—even dramatic—if not always successful: technology, capital, increasing population, transportation, means to settle the hostile Indian question, and a culture that came to dominate and tame the environment. The mining history of New Mexico has the bulk of its detail in this century. In terms of production, only an insignificant amount of the total predates 1880.

The epic tale sweeps headlong toward the last quarter of the 20th century with no weakening of theme. The reality of copper, uranium, petroleum, and other products that we equate with the great commercial enterprises so much a part of American society, did not dampen the persistent belief in the minds of the searchers that this was the land of quick wealth, that in some remote canyon they would find the Seven Golden Cities of Cibola, the mythical Land of Quivira, or the Adams Diggings. The piñoned hills and red bluffed canyons would then echo with the cries of "GOLD!"; cities would rise from the desert and mountains, and New Mexico would take her rightful place among the great bonanzas of the world.

The story of mining in New Mexico must be told in this framework—a framework that conditions the acts of men, the policies of nations, and the flow of empire. It is an imperial theme.

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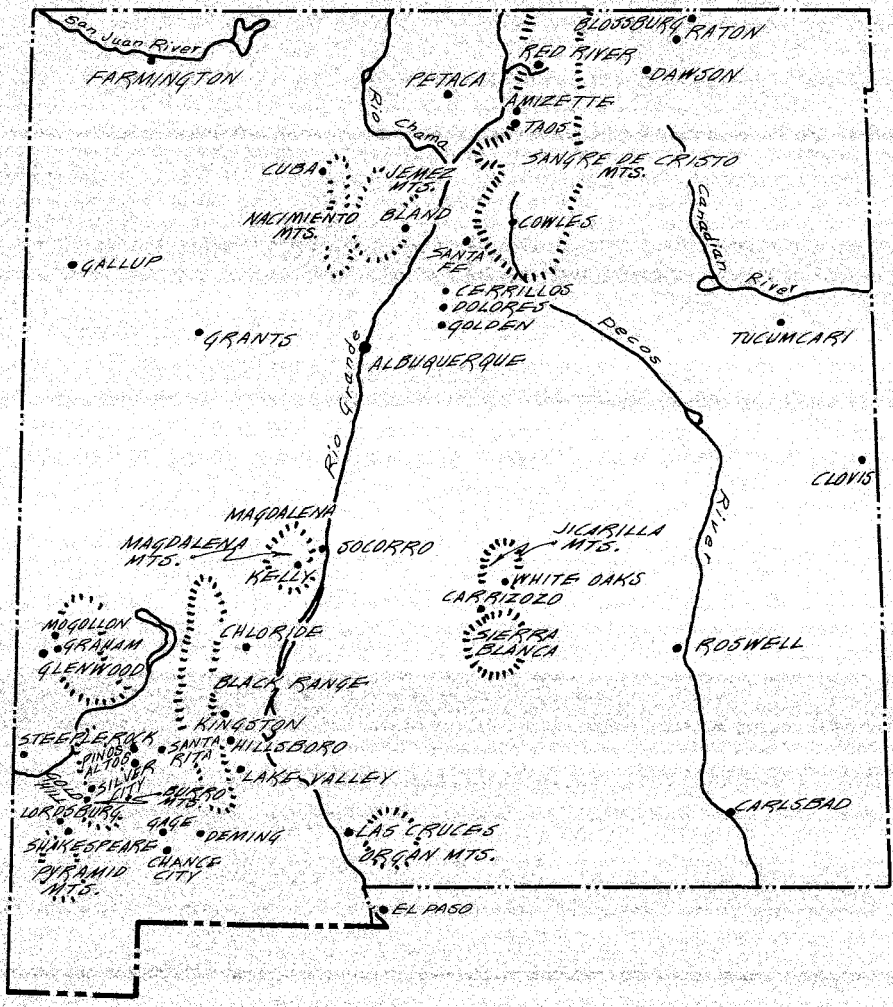


MAJOR MINING CAMPS AND PRINCIPAL TRADE CENTERS.

Indian and Spanish Mining

To the Indian, mines and mineral resources came from benevolent gods, and were, like the Indians themselves, a part of nature. During the thousands of years when the Indians were the sole occupants of the Southwest, their use of mineral resources was rudimentary and largely accidental. Primitive man saw the lighting of a fire or use of a mineral in the same sense that he saw his ability to walk or to use his arms. In the course of constant manipulation of a multitude of objects in nature, he chanced upon a new and useful resource—minerals. Invention in primitive society was just another aspect of nature: a part of nature's power to furnish man with certain novel devices. The Indian utilized what he found in nature, for tools, decoration, trade, and in his religion.

The Indians of New Mexico used a number of mineral products. Many of the silica minerals, because of hardness coupled with conchoidal fracture, have the longest history of continuous use. The qualities of chert, flint, obsidian, jasper, and certain other minerals meant that with skilled handling, they could be shaped into various tools such as arrowheads, scrapers, spearpoints, and drills. Basic tools of various types were made during the long twilight of primitive man's emergence in New Mexico. Use of these tools persisted into the Spanish Colonial period. Stone tools were made by striking a piece of suitable material sharply with another stone or piece of bone, antler, or hard wood; taking a flake from the main core. The artistry and craftsmanship achieved by primitive man with this process was truly remarkable. For thousands of years the Indians of New Mexico sought the best mineral localities to supply their needs. Some resources, such as obsidian, became valued trade items among southwestern tribes. The Indian prospector, like his modern counterpart, roamed the hills seeking his own form of treasure. Unlike modern man, the Indian was unable to mine on a large scale. His technology and tools were too primitive to strip off much of the earth's surface or break up large quantities of rock to find treasure; he was tied to the surface materials, or float, or to materials only a few feet below the surface. Thus, despite the fact that a wide variety of rocks and minerals were mined in New Mexico, ancient diggings are difficult to recognize.

Some digging sites have been found, however. Apparently, flint and chert were mined by the Indians at ancient workings along the south side of Cerro Pedernal (flint hill), a few miles southwest of Abiquiu. Tools made from these materials have been found in ruins in many parts of the Rio Grande valley. Modern-day rockhounds searching for agate and jasper might well find evidence of ancient Indian mining wherever these minerals are located in substantial quantities. Efforts to locate and utilize siliceous minerals with conchoidal fracture, both by ancient Indians and modern rockhounds, span a period of possibly 20,000 years.

The Indians were also builders. They lived in simple shelters and caves at first, then in crude pit houses. Finally, they moved above ground and evolved building techniques and styles of architecture that have stood the ravages of time, and still serve the inhabitants of the Southwest. Perhaps the most spectacular buildings are the great houses of Chaco Canyon. Some must have sheltered from one to two thousand people each. As achievements in building, both from the standpoint of durability and graceful construction, these great houses rival the structures of the historic valleys and plateaus of the ancient eastern world. While a number of natural building materials were utilized by the Indians at different times, such as adobe, timber, brush, and clays, stone was the predominant material during the epic building period from A.D. 1000 to A.D. 1400. Stone, found by chance, or quarried from limestone or sandstone outcrops, was

important to the Indian architect and his society. In most cases, building stone came from the immediate vicinity because most everything had to be hauled by hand—a long, tedious process. Mining methods were crude indeed, yet vast quantities of stone were moved to build the great structures at Gran Chaco, Aztec, Bandelier, Gila Cliff Dwellings, and a thousand unnamed sites, large and small, throughout New Mexico. Though the romance of roaring camps and rushes was lacking, this achievement ranks among the great mining enterprises in the history of New Mexico; the enduring results are a lasting tribute to an industrious people.

Clay was another indispensible mineral product, particularly in demand by Indian potters. The search for suitable clays was extensive. As the techniques of pottery making, perhaps the greatest technical achievement of the Indians of New Mexico, became more advanced, the need for high-quality clays became more acute. The Indian prospector searched the river beds and canyons for the best clays for cooking and storage pots, and more important, those highly decorated, beautiful pieces of ceremonial pottery used in offering prayers to the gods of rain, earth, and sky.

Turquoise mining was probably the closest the Indians came to the commercial mining of later periods. The blue- and green-hued semiprecious stone had great ceremonial meaning to the Indians of the Southwest, and was highly prized for ornamentation. Although soft enough to be shaped, polished and drilled with primitive tools, turquoise had great durability. While direct evidence is scanty, deposits in four localities were exploited for turquoise by the Indians of New Mexico. The most important was near Cerrillos, 16 miles southeast of Santa Fe; one was in the Burro Mountains, southwest of Silver City; another near Old Hachita, south of Lordsburg; and another in the Jarilla Mountains of Otero County.

The ancient mines near Cerrillos, probably the oldest in North America, are located on the slopes of Mount Chalchihuitl (an Indian word for turquoise). The mountain, really no more than a moderate-sized hill of white and yellow rock, is a conspicuous feature of the landscape. How early these mines were worked by the Indians is unknown, but the fact that turquoise has been found in some old archeological sites indicates that the stone was in demand for many centuries before the coming of the Spaniards. For example, turquoise beads, pendants, and inlay work have been found at Pueblo Bonito in Chaco Canyon, dating from about A.D. 900 to A.D. 1100. Some gems uncovered at ancient sites remain in their native form, while others were carefully shaped and polished by accomplished craftsmen.

The Burro Mountains of southwestern New Mexico, now famous for copper production, were first worked by the Indians for turquoise. Accounts of early European prospectors and miners tell of extensive dumps containing stone hammers, fragments of pottery, and other relics typical to prehistoric mining.

Indian turquoise mining was primitive, stone tools being the primary implement. Some hammers found in the mining debris are quite large and pointed, and were probably used as picks. Frequent occurrence of charcoal in the old workings indicates that some of the mining was done by heating the rock and then pouring water on the heated surface, causing it to crack and spall. Stone hammers were then used to separate the turquoise from the matrix, a difficult process that often destroyed more gem material than was recovered. With such a slow and tedious process, the amount of mining in evidence must have taken centuries. When the Spaniards arrived at the mine on Mount Chalchihuitl, the pit measured approximately 200 ft across at the top, 100 ft at the bottom, and 130 ft

at its deepest point. The dumps covered many acres. In terms of our standards of value, the labor, capital, and time involved in mining such gems would have given them the value of diamonds.

Results of Indian turquoise mining in New Mexico can be seen in famous museums of the United States, Europe and Mexico. The large quantity of turquoise in the possession of the inhabitants of Mexico at the time of the conquest by Cortez in 1519 probably came from the mines of Mount Chalchihuitl and the Burro Mountains. Turquoise, highly esteemed by the ancient Mexicans for use in mosaic and inlay work, was used to ornament the famous throne of the Tezones. Spanish writers at the time of the conquest frequently refer to turquoise. Some of the presents sent to Cortez by Montezuma contained this semiprecious blue-green stone. These, in turn, forwarded to Emperor Charles V, are believed to be among the crown jewels of Spain to this day. Fray Marcos de Niza in 1539, and Coronado in 1540 to 1541, both made reference to turquoise among the Indians of the Southwest, particularly the Pueblo peoples. Assuming much of the turquoise they referred to came from the mines of New Mexico, this mineral must have played a significant role along the trade routes of North America in prehistoric times.

Although the Indians never mined turquoise in great quantity, their labor can be singled out as the activity in the Indian world most resembling modern commercial mining. This blue-green stone, so much a part of modern New Mexico, is still the symboi of the Indian craftsmanship, and although of nominal value, must have sparked great excitement, and, in terms of ancient value systems, produced great wealth for those who mined it.

Colorful ores or clays, often associated with the occurrence of copper or iron, were frequently utilized by the Indians of New Mexico. It is important to emphasize that they were prized for their color, not their intrinsic value as metal ores. They served as pigment for picture writings, to daub the Indians' faces or bodies for ceremonials, to create primitive art work, and for a variety of other secular or religious uses. This mineral use contributed another small dimension to mining in the Indian world.

Ancient man in the Southwest utilized coal found in many areas from early periods. In New Mexico, coal has been found in association with man as early as 12,000 years ago. Coal ash, found in ancient pueblos in both the Hope area and San Juan river region, dates to A.D. 1300. The shiny, smooth blackness of coal, particularly the variety known as jet, attracted the attention of the Indians for decorative and ceremonial use, and possibly for fuel.

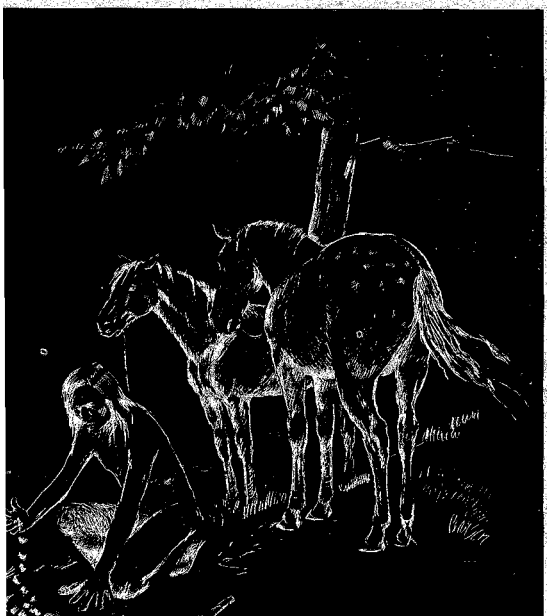
Other items classified as minerals were prized by the Indians. While native copper, found commonly in some areas of New Mexico, was used in its native state for fetishes, decoration, or trade, the Indians of New Mexico had not developed a knowledge of even the simplest metallurgy to put native metals to work. Although some worked copper has been found among the prehistoric Indian ruins, we assume the Indians acquired these items by trade (perhaps for turquoise) from Indians of Mexico, who knew how to smelt and cast copper. Gold and silver, both found in their native state here, were apparently unknown to the Indians.

So the Indian miner did his job like many others to follow. He supplied the materials with which his contemporaries built their cities; he searched out the minerals with which the craftsmen made the tools; to the far-flung trade routes, he supplied the clays for the potters and the artists, and the most important single item—turquoise. Like the Spanish and American miners who followed, he left his glory holes, dumps, and debris. But to our knowledge, he had no roaring camps

and left no ghost towns. None of the Indian ruins dotting New Mexico today can be traced to mining activity; history left us no record of the Indian prospectors and miners who must have played a significant role in their society, yet the remote canyons of New Mexico once resounded with the blows of their stone hammers.

The Indian was not destined to retain his exclusive control of the resources of New Mexico. With the opening of the 16th century, a new force was abroad—one that would grow and strengthen, leaving a deep imprint on New Mexico. Beginning in the wild islands of the Caribbean then fanning out into the heart of Mexico and the South American continent, this new force spread across the face of America. On came the Spaniards, bent upon conquest for its own reward, for the glory of God, and for gold. These sturdy Europeans from the Iberian Peninsula, with weapons vastly superior to those of the Indians, with the horse—which made them highly mobile and devastating in battle—and with tactics and precision in warfare unknown to the Indians, marched across the great cultures of North and South America without serious setback. The destiny of New Mexico and the trusteeship of its mineral resources became their charge.

With the Spaniards, came the stored-up knowledge of Europe, and nearly 50 years' experience in the New World. By the time they reached the American Southwest, they had developed a feeling that the mineral wealth in the New World was easy not only to locate, but also to mine. And why not? Placer gold had been discovered in the islands of the Caribbean, and while it did not result in the vast wealth of later discoveries, the approximately half-million dollars in gold was a bonanza to Europe, poor in gold reserves. As the Spanish spread their conquest, other sources of wealth quickly appeared. Between 1519 and 1521, Hernando Cortez assembled the Aztec treasure in Mexico—probably the greatest single amassed fortune in precious metal seen by Europe to that date. From Peru, Francisco Pizarro sent vast accumulations of gold to the Spanish Crown. No wonder, in the Spanish mind, the New World was one great cornucopia, capable of pouring out any quantity of gold and silver bullion. All one had to do was search it out. In truth, these newly discovered continents were rich, but not



16TH CENTURY INDIAN PROSPECTOR.

everywhere; they were a cornucopia, but not always flowing gold and silver; it was exciting, and drove the Spanish with a persistence seldom witnessed in history.

They also had their disappointments. As a result of their early successes, the Spanish became overly optimistic. In addition, they were susceptible to superstition. These traits are the building-blocks of myth and legend. After the initial great discoveries, most of the expeditions seeking mineral wealth were chasing legends—some of them age-old, imported from Europe—some of them generated in America. The search for El Dorado, the Gilded Man, was one; the search for Sierra Azul, the mountain of silver, another; the Seven Golden Cities, the land of Quivira, and so on. All legends, and all responsible for the formation of heroic expeditions that pushed the Spanish Empire in America ever on to new frontiers. Myth and legend became nearly as important in the mining history of the Spanish Empire as did actual mines. New Mexico was unfortunate in that fantasy played the dominant role, and mining and prospecting the lesser one. Therefore, the history of Spanish New Mexico was not to be heavily influenced by miners, but rather by black-robed Franciscans, Spanish citizen-soldiers, herdsmen, and royal officials.

Two aspects dominate the history of mining in New Mexico during the period that the area in the New World was a part of Spain: First was the epic period of exploration beginning with the first hints of New Mexico in the journal of Cabeza de Vaca, who entered the Southwest in 1536, and lasting until the last quarter of the 18th century—nearly 250 years. During this time the motivating force behind the prospector was more often hope and legend rather than actual production of wealth. The second aspect was the actual productive mining in New Mexico. This part of the story is limited to a few isolated cases, most of them occurring during the last half-century of Spanish control, the period after 1750. Much of this latter period has been shrouded in fancy rather than fact.

The idea of great mineral wealth everywhere in New Mexico was first planted in the Spanish mind by Cabeza de Vaca. This early-day wanderer was a member of the ill-fated expedition of Pánfilo de Narvaéz, who led an effort to conquer and colonize Florida in 1528. The loss of their ships after landing in Florida prompted them (about 300 men) to attempt to reach Mexico by land. After unbelievable hardships, years of slavery among the Indians of the Gulf coast, and a trek from Florida to the west coast of Mexico, only Cabeza de Vaca and three other survivors reached Spanish outposts in Mexico in 1536. Subsequently, Cabeza de Vaca wrote a journal recounting his epic adventure. In this journal, the first hints of a high Indian civilization and wealth in New Mexico appeared. Although his hard-pressed party only touched the southernmost part of New Mexico if they entered it at all, he recorded reports from the Indians he met regarding the advanced cultures to the north. There were also indications of mineral wealth. While among the Indians of Texas, Cabeza de Vaca wrote: "There one of the party got a big rattle of copper, large, on which was represented a face, and which the Indians held in great esteem.—Where ever it might have come from, there must be foundries and that metal was cast in molds." Later, possibly while in southern New Mexico, de Vaca reported his party was "presented with five emeralds, shaped as arrow points." The Indians, according to the journal, "said it was from some very high mountains toward the north, where they traded for them with feather-brushes and parrot-plumes, and they said also that there were villages with many people and very big houses."

While these statements may not convey the idea of great wealth, many citizens of New Spain (Mexico) were ready to believe the continent to the north of

Mexico was a vast treasure chest. By 1536, much of the quick wealth in Mexico at the time of conquest was exhausted. The newcomers to this land, hoping to reap fortunes, found little left. Hence, the slightest suggestion of great cultures with cities, large houses, and advanced metallurgy fired them with new hope and enthusiasm. It became another "Mexico" (the Aztec city which produced so much for Cortez and his troops). In the north they could realize their fortunes and return to Spain in the favor of their glorious king.

But officialdom in Mexico, represented by the very able Viceroy Antonio de Mendoza, was cautious, and decided to send out a small expedition to confirm the vague hints brought back by Cabeza de Vaca. This expedition, led by the Franciscan Fray Marcos de Niza, left Spanish outposts for New Mexico in March 1539. The expedition moved north and finally arrived near the pueblo of Zuni, New Mexico. Here Esteban, who made the journey with Cabeza de Vaca and acted as guide to de Niza, was killed. Marcos de Niza, fearful of continuing on for a close look at Zuni, listened to the tales told by the Indians and retreated the way he came.

While the reports of Cabeza de Vaca were vague, they were relatively objective in their assessment of what was to be found in the north. Not so with those of Marcos de Niza. He related, on his return, of Indians who had vessels of gold and wore round golden ornaments in their noses and ears. Turquoise was plentiful, used lavishly for personal adornment and architecture. These ideas came from "conversations" with Indians whose language he did not speak. He saw none of it personally. For those in Mexico, this evidence was sufficient. Excitement ran rampant, even among royal officials. The result was the ordering of a formal and official expedition to explore and conquer New Mexico.

An ancient legend originating among the Christians living in the darkness of Moorish-controlled Spain told of an archbishop and six of his bishops who fled Spain, thus taking their respective peoples out of the path of the invading African Moors. They fled by ship into the unknown Atlantic basin, into the sea of darkness. Somewhere in that vast expanse of sea and mystery, they found an island, and each of the seven prelates founded a city for his people. This spot came to be known as the island of Antilla, and had a holy radiance in the minds of men in Spain. Because these cities were places of miracle and perfect Christian peace, the sands they stood on would be gold. Marcos de Niza reported seven cities at Zuni, and the extravagance of his descriptions gave the Spanish hope that the seven cities of Antilla had indeed been found, and in New Mexico. He named the land of the golden cities "The Land of Cibola." What a find! The Island of Antilla at last—and located within easy reach or Mexico, too! The drive to conquer the Seven Golden Cities of Cibola had begun.

Here enters Francisco Vasques de Coronado, caballero extraordinary, born to the highest Spanish nobility, acceptable to viceroy and crown, and destined to lead an expedition most golden. He was also destined to degrading failure. In 1540, the host assembled by Coronado having attracted some of the leading figures of adventure in Mexico, sped north, guided by the "expert," Fray Marcos de Niza. The riches they sought lay just inside what is now New Mexico, at the pueblo of Zuni. The expedition, which to that point had been so driven by passion and enthusiasm, experienced the first of its burdensome failures. There were no golden riches at Zuni. If the Seven Golden Cities existed, they still lay beyond the horizon. Corn and other foods were stored at Zuni. There was a city—as they had expected—and prosperous fields for crops—but these things, which represented great wealth to the Indians, were mere necessities to the invading army. They took what they needed. Finding no gold or silver, and little

turquoise, the disappointment of the Spaniards deepened and darkened, and Marcos de Niza, for a second time (probably to save his life), beat a hasty retreat back to Mexico. Coronado and his men, heartened by reports of other cities to the east, passed beyond Zuni and entered the Rio Grande valley of New Mexico. Again there was disappointment and failure. Exploration yes, people and new vistas, yes, but not the quick wealth they sought. There was no prestige here, no fortunes to be made, only hardship without reward, and death in a hostile land. Damn Coronado!

But wait—new hope appeared at the pueblo of Cicuye (modern Pecos) in the form of an Indian captive who told the most amazing story. They called him El Turco, from his oriental appearance, and this is his story. Far to the northeast lay the country called Quivira, a land of shining cities and treasures of gold—where a grand chieftain napped in the afternoons in the shade of a tree hung with little golden bells whose movement in the breeze made music, lulling him into slumber. The Spanish listened, despite the disappointments at Zuni and the Rio Grande valley. This tale confirmed what they came for; obviously the mineral treasure was just a little farther on. Were these the Seven Cities?

In vain, Coronado and part of his expedition searched for Quivira, penetrating the great plains to the area of the big bend of the Arkansas River, near modern Wichita, Kansas. Again, disappointment and failure. Thus, in the early relations between Indians and Spaniards, occurred the first great mineral hoax in the history of North America, and the Spanish were on the receiving end.

The dream faded, hope died, and the whole effort was abandoned. The expedition returned to Mexico in tatters—Coronado returned in disgrace. He reported no quick wealth in New Mexico, only an industrious people with fairly advanced cultures, living in towns and devoted to working the land for its agricultural wealth. This disclosure, along with the opening of rich silver mines in Mexico, put New Mexico into the file of lost causes. Forty years were to pass before the tragedy of Coronado would dim and New Mexico would again become a focal point in the Spanish search for mineral wealth.

Despite the search made by Coronado and his heroic expedition in a hostile land—and their failure—we now know a considerable amount of precious metal was stored in the earth beneath New Mexico—hidden in the high vastness of the mountain ranges, or up on the mesas, far from the safe valleys and the water. The mountains were never the domain of the Spanish. The Europeans stayed in the valleys, both in terms of their entry routes and settlement patterns, thus bypassing the wealth so close at hand.

The lull following Coronado's failure was short-lived. After 1540, the Spanish frontier line crept steadily north from the valley of Mexico. Vast quantities of silver were found and exploited near Zacatecas and Durango, Mexico (these areas quickly became the leading silver producers in the world); Spanish enthusiasm and imagination were generated anew. Legends began to creep into the discussions of the land to the north, still referred to as New Mexico. One told of a great mountain of silver, La Sierra Azul, containing riches far beyond anything yet discovered. Miners and prospectors from frontier mining camps with marginal production began to explore toward New Mexico and Texas in search of this great range of mountains. They failed!

New Mexico was conquered and colonized, but not because of her mineral resources. Two factors sent Juan de Oñate and his colonists north from Chihuahua in 1598. Of primary concern were the souls of the sedentary Indian population in New Mexico; they became one of the important mission targets of the Roman Church in the New World. Throughout the history of New Mexico,

this religious theme was constant—the mission system remained a prime reason for Spanish occupation of New Mexico. The second reason was defense of the empire. By 1598, pressures were coming to bear on Spain from other European nations seeking colonies in the New World. By this time, the British had attempted several colonies, and were only a few years away from permanent control of the northeast coast of North America. The Dutch and French were also penetrating areas in the Americas; the New World was no longer the private domain of the Spanish and the Portuguese. The richness of the silver mines of central Mexico dictated policy for the Spanish, who now deemed it necessary to establish a military outpost on the northern frontier as a buffer against foreign intrusion. These two factors, the missions and the military, remained the central concern of Spanish policy on the northern frontier, and were permanently woven into the history of New Mexico.

Several other themes evolved, discouraging mining activities in the Spanish colony. The nomadic Indians presented the foremost problem. The Pueblo people, except during the period of the Pueblo Revolt from 1680 to 1692, were brought under the domination of the Spanish, and became a part of the Spanish colonial system. Other Indian groups in the Southwest, however, presented a dangerous situation to the Spanish. The Apaches (including the Navajos), the Comanches, and other nomadic or semi-nomadic tribes, never accepted Spanish authority and never became a part of the system. They did, however, learn to utilize a number of things from both Pueblo Indian and Spanish cultures. The nomadic tribes, who practiced little or no agriculture, were enticed by the stored-up foods in the Pueblos in and along the fringes of the Rio Grande valley. Throughout the colonial period, with increasing frequency in the 18th century, they raided the Pueblo Indian communities. From the Spanish they acquired the horse, and by the early 18th century, the Apaches and Comanches had become excellent horsemen. One thing they did not learn, however, was how to breed their own horses—hence they were constantly in need of new mounts, and their only source of supply was the Spanish. Because the Spanish did not give away horses willingly, the Indians took what they needed from ranch herds, military herds, or civilians. By the late 18th century, Indian raids had not only reduced horse herds to dangerously low levels in New Mexico, but they had severely depleted the human population of many areas as well. Protecting the friendly Indians and the Spanish settlers in New Mexico required tremendous effort. Defense against hostile Indian attack consumed most of the time of most of the people in New Mexico, leaving little opportunity to search for mineral resources or develop known ore bodies. Furthermore, these Indians controlled the mountain country where the bulk of the mineral wealth was located. Never during the Spanish period did the white man exert enough control to adequately exploit the mineralized zones.

Poverty was another constant theme in colonial Spanish New Mexico. Several factors were responsible. The limited economic base, primarily agricultural and pastoral, brought only subsistence income. Trade, both in Spanish and Indian products, was never very productive of wealth for New Mexicans. The trade over the Camino Real from Santa Fe to Chihuahua was a tightly controlled monopoly in the hands of the Chihuahua merchants. While goods of considerable value passed over the Royal Road in both directions, New Mexico's economy benefited little from the trade. As a result of these limited opportunities for accumulation of wealth, New Mexico did not have the means of gaining sufficient capital to develop its mineral resources. Military needs, missionary zeal, constant Indian

attacks, and poverty—almost degrading poverty—combined to severely limit the development of mineral wealth in New Mexico during the Spanish period.

The followers of Oñate and others who came to New Mexico during the years of Spanish occupation did not neglect the legends and myths of the past. Although they searched for quick wealth, they were not knowledgeable concerning minerals and ores; and by-and-large, wasted their efforts. Thus the story during most of the Spanish period in New Mexico is dominated by legends and myths, errors and miscalculations. Mining and mineral riches, so much talked about, were not to play a significant role in the history of the land of the Seven Golden Cities. There was some mining activity in New Mexico, however, leading to the second aspect of the story of mining during the Spanish period.

The limited documentary evidence available in local archives reveals a number of "minas" registered by various Spaniards during the colonial period. This information has been the source of considerable speculation that these were producing mines. Most of them were only claims to ground suspected of having mineral potential, with little or no serious exploration work ever having been done on them. Some were prospected—small exploratory shafts were dug—but with few exceptions, they were too small to be classified as mines. By-and-large, the Spanish settlers in New Mexico were uninformed about ores and minerals except for ores having direct applications as found in nature—natural metals, turquoise, and so forth. As a result, claims were frequently filed because of unusual color, evidence of crystallization, or some other visual aspect—without any knowledge of the actual character of the mineral in question. The few mining efforts that produced some useful ores were generally developed late in the 18th century, near the end of Spanish control of New Mexico.

Probably the earliest commercial mining efforts by the Spanish were for turquoise, that symbol of the sky powers. In the Burro Mountains of southwestern New Mexico, and on Mount Chalchiuitl near Cerrillos, the Spanish picked up where the Indians left off, and continued to produce some marketable turquoise, The effort was sporadic, the amount of wealth generated must have been small, and the best market remained among the Indians. Some turquoise found its way into the trade routes and filtered into Mexico. While the mines in the Burro Mountains were never very important during the Spanish period, due to Apache raids in the vicinity, the mines near Cerrillos continued to operate periodically well into the 19th century.

The Cerrillos district produced more than turquoise. Following the reconquest of New Mexico in 1692 by Diego de Vargas, interest was again shown in Los Cerrillos. In addition to the turquoise deposits on Mount Chalchiuitl, the occurrence of valuable minerals in the area had been known for some time. Although the Cerrillos region became well known in the 19th century for gold, the area was apparently worked for lead, and possibly silver, during the Spanish period. At Cerrillos, probably in the second decade of the 18th century, the first workings of the famous La Mina del Tiro were developed. Known to be in operation by 1722, the mine may have been worked before the Pueblo Revolt in 1680. Certainly the first metal mine in New Mexico, and the only documented example of underground lode mining by the Spanish in the Southwest, evidence indicates that this was one of the most ancient metal mines in North America.

There are no Spanish descriptions of La Mina del Tiro. Our best descriptions are from miners coming into the area during the gold rushes in the 19th century. One such report in the 1870's told of the remnants of the Spanish mine. At least two shafts tapped the vein of lead. The discovery shaft, nearly 200 ft deep,

followed a crevice, dipping at 60 degrees. Another shaft, 30 ft off the vein and about 100 ft from the first shaft, angled to strike the vein, and also penetrated to the 200-ft level. The two shafts were connected by a lateral at that depth. Several drifts up to 300 ft in length followed ore veins away from the shafts. Evidently, deeper shafts that once existed were flooded and abandoned. Regardless of the accuracy of this description, a substantial mining effort at La Mina del Tiro at Cerrillos cannot be doubted.

An interesting sidelight to the Cerrillos district during the Spanish period was reported in the Santa Fe New Mexican in 1879:

> *a specimen of the handiwork of the ancient Spanish miners inhabiting the territory was brought to town from the Cerrillos mines a day or two since. It is a casting from what seems to be pure silver, and is, taking a front view, in the shape of a crown. Its weight is nine pounds and fourteen ounces. If pure silver, its intrinsic value is about $150.00, but there is supposed to be some gold in it, which of course would add to its value.*
>
> *This remarkable ingot was discovered under a boulder about half a mile to the southeast of the celebrated turquoise mine in the midst of the new discoveries. It is well known that royalties were required of the miners by the old kings of Spain, and this may have been cast to be used in payment of this demand; but on account of its peculiar form it is more likely that it was intended as a present to the king. Whatever may be the true solution of this question, it certainly is one of the most interesting curiosities ever found in this region of country.*

What speculation such a report must have created in the new mining camp of New Placers! What rich, lost mines were in the vicinity? What great discovery would follow the turn of the next spadeful of dirt? No mine as old and as famous as La Mina del Tiro could exist without parallel development of romance, legend, and myth.

The early dates of its origin and fame did not, however, mean that La Mina del Tiro produced great amounts of wealth. Doubtless it supplied some lead for a variety of local uses; possibly some silver. The nature of the ores probably did not allow refinement for maximum use. Few, if any, on the frontier at this time knew the techniques of smelting and refining. Fewer still, the technique of separating silver from other materials by the patio process (mercury amalgamation).

19TH CENTURY METHOD OF SORTING ORE BY HAND.

Without such technical knowledge, only near-native metals could be utilized. The complex ores that made New Mexico such a rich mineral area in the late 19th and 20th centuries required technical skills not known to the Spanish.

Probably the best known Spanish mine in New Mexico was the Santa Rita copper mine in southwestern New Mexico, near modern Silver City. As with most early mining operations, the discovery date is uncertain. Possibly, native copper—the principal mineral exploited during the early mining history of the area—was collected by Indian miners for many hundreds of years before the Spaniards entered the Southwest. In terms of Spanish exploitation, copper was discovered in 1798 by an Apache Indian who in turn, told Col. Manuel Carrasco, who had befriended him. Carrasco, familiar with the Rio Tinto copper mines in Spain, was apparently aware of the value of the find. Despite his knowledge, he was unable to work the property himself, being deeply involved in military affairs on the frontier of New Spain, and lacking sufficient capital resources to develop the mine. Therefore, he interested a wealthy Chihuahua merchant, Don Francisco Manuel Elguea, to help develop the find. Elguea, a good choice, was a banker with access to large amounts of capital, a delegate to the Spanish court, and thereby able to exert influence to obtain mining rights in the area. As a result of his activities, the two men received the Santa Rita del Cobre Grant. In 1804, Elguea bought out Carrasco. Shortly thereafter, Elguea worked out a contract with the royal mint in Mexico City to purchase the copper from Santa Rita. These early mining efforts handled high-quality native copper requiring only simple processing before shipment to Mexico City, 1,300 miles distant. Crude adobe smelters were constructed to handle the ores. An estimated 200 mule trains, or about 20,000 loads of 300 pounds each, reached Mexico City annually. That would amount to about 6,000,000 pounds of copper per year—a massive transportation achievement, considering the frontier conditions and extreme distance.

Copper needs in Mexico were high at the time, and had been for many years. The nature of Spain's administrative policy in regard to her colonies was to drain off most of the gold and silver bullion produced in the New World to support Spain's expensive relations in Europe. The result was a constant shortage of metal for coinage in New Spain. Copper was an acceptable metal, having been widely used for coinage in Spain for several centuries. Copper reserves in Mexico were in short supply, thus the discoveries at Santa Rita were exciting and for a few years, New Mexico metal played a significant role in the Mexican monetary system.

Elguea, a good manager, made several trips to his mining properties in New Mexico, and came to recognize some of the problems of mining on this harsh frontier. Indian raids were constant and dangerous. To protect his mining interests from disaster at the hands of hostile tribes, he ordered the construction of an adobe fortress built in the shape of a triangle. Each corner had a tower of the Martello type (circular), with loopholes in the towers and in the walls connecting them. In addition to defense, the fort served a second purpose. Mine labor was not available in the area of Santa Rita del Cobre—no sedentary Indians or residents of Spanish settlements to be pressed into service. Again, Elguea used his influence in Chihuahua and Mexico to get permission to transport prison labor to Santa Rita to work the mine. The fort served both to confine as well as protect the convicts.

Elguea died in 1809 and extensive mining in the area of Santa Rita declined. Increasing costs, difficult transportation problems, increasing Indian problems, and declining demands for copper in Mexico all brought mining at the copper

pits to a standstill. Also, in 1810, the Mexican Revolution for national independence began at Dolores, led by the Mexican patriot, Father Hidalgo. The disruption of the royal government and its ultimate demise resulted in sharp cuts in the Mexican need for copper. The silver mined in Mexico remained in Mexico and began to replace copper as the circulating medium of exchange. Despite intermittent efforts to work the mine under a number of lessees during the remainder of the Spanish colonial period and the period New Mexico was part of Mexico, the exciting and profitable period for the Santa Rita mine was during the first years under Don Francisco Elguea. Not until after 1880 would the area again become a significant copper producer.

In addition to Santa Rita and Cerrillos, stories abound about mining during Spanish days in a variety of other places in New Mexico. Most of these claims cannot be documented and must remain hearsay and myth. Several mines had some production, or at least the possibility of some. At Petaca, in Rio Arriba County, mica was found in sheets large enough to be used for windows. Reportedly, some of this mica was mined and sold in Santa Fe. Some native copper found in Rio Arriba County may have been used to manufacture copper cooking utensils. In the Rio Hondo near Taos, numerous reports from later American miners of Spanish mines in the vicinity are unconfirmed by contemporary sources. Far to the south of Santa Fe, at Socorro, persistent reports of silver mining on Socorro peak during the Spanish period were heard. Again, documentation is lacking. Probably, coal outcrops were mined at a number of local sites. If other Spanish mines existed, they were small and had only local impact.

The Spanish, as we have now seen, practiced commercial mining to some degree in two principal areas. One near Cerrillos, just south of the colonial capital at Santa Fe, where they mined turquoise from the old Indian mines, and opened the first metal mine at La Mina del Tiro. The second area was in the vicinity of modern Silver City, where they mined turquoise in the Burro Mountains and copper at Santa Rita. Beyond this, mining in Spanish New Mexico was on a low level, limited to small-scale local developments.

We cannot end our discussion of Spanish mining without one last legend, one that became popular many years after the Spanish lost control of New Mexico. The legend, "The Lost Mines of the Aztecs," located the source of the Mexican Indians' wealth as being in New Mexico. These mines were, according to one version of the legend, in the area north of Taos. Allegedly developed and worked by the Spanish between 1598 and the Pueblo Revolt of 1680, the mines were lost to the world when the Pueblo Indians revolted and massacred the Spanish at Taos and Santa Fe. The Indians, who had been forced to work in the mines, filled the shafts and tunnels, completely wiping them out of existence. The mines had produced over $14,000,000 in silver—and even more in gold—before they were closed and lost. According to legend, the shafts were so effectively filled they they can never be found again. We began our discussion of Spanish mining with the legend of the Seven Golden Cities of Cibola, and end with the legend of the Lost Mines of the Aztecs.

In total, the Indian and Spanish mining efforts are not impressive in terms of 20th-century standards. The Indians used nature as they found it—their technology prevented more. The Spanish did less. Not of the stone age, the Spanish had little need of the stone products that dominated Indian mining efforts. Most of the metals in New Mexico, particularly gold and silver, remained hidden from the Spaniards, although they found enough by prospecting to generate considerable discussion. The Spanish imported most of their metal

Photo Collection, Museum of New Mexico

RELICS FROM THE PERIOD OF SPANISH MINING AT SANTA RITA MINE, SOUTHWESTERN NEW MEXICO. NOTE LEATHER CARRYING BAGS FOR ORE. THE NOTCHED LOGS WERE LADDERS FOR ENTRY AND EGRESS FROM THE MINE.

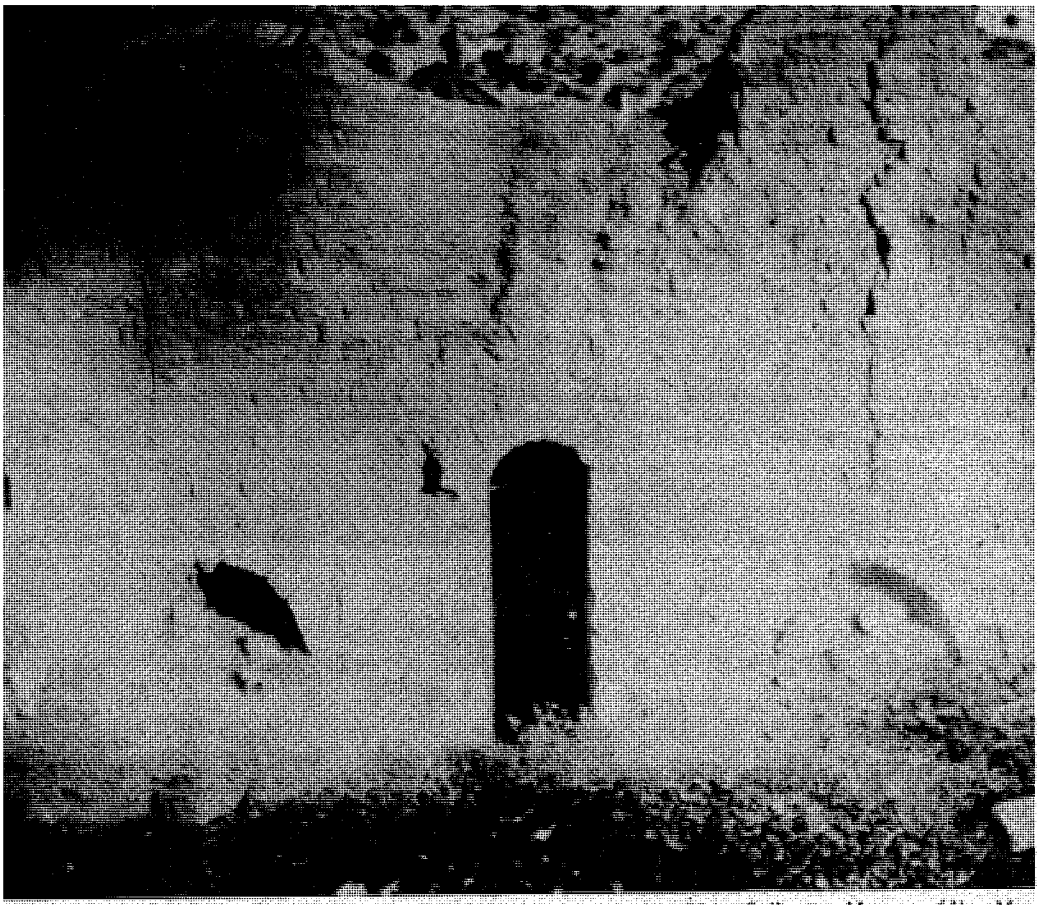


Photo Collection, Museum of New Mex

OLD ADOBE FURNACE USED FOR REDUCTION OF ORES, SANTA RITA, NEW MEXICO.

products and concentrated their efforts in New Mexico on agriculture, stock-raising, and survival against ever-increasing attacks of hostile Indians.

From that time in some dim antiquity when the first Indian miner struck into the earth with his stone hammer, until the end of the Spanish colonial empire in America about 1820, mining played a minor role in the life styles of the people of New Mexico. The real story of mining in the Land of Cibola began as the 19th century unfolded.

The Formative Years, 1820 to 1860

The opening of the 19th century saw radical changes in New Mexico, and for a moment we must digress from our discussion of mining to look at broader historical patterns. The province, part of the Spanish Empire claimed by Coronado in 1540, became a part of the independent Mexican nation in 1821. During its entire economic life as part of the Spanish Empire, New Mexico was tied tightly to Chihuahua and New Spain by the thin line of the Camino Real between Santa Fe and Chihuahua City, and by a rigid commercial policy that restricted all other trade. After 1821, a new trade route was opened, stretching east to the Mississippi valley and the United States. These changes set in motion a number of forces that were to have a dramatic effect on mining and the development of the mineral resources in New Mexico. First, American influence increased throughout the period from 1820 to 1860, both official and unofficial. Second, the internal problems facing the newly created nation of Mexico would have a depressing effect in New Mexico. Third, attacks by hostile Indian tribes were a constant threat to most of the communities in New Mexico. And fourth, from the moment New Mexico became a part of the United States in 1848, it was drawn into the growing conflict that ultimately led to the Civil War.

Lasting and deep American influences in New Mexico began with the opening of the Santa Fe Trail in 1821. Although earlier contacts had been made, these were fleeting and did not result in many Americans living in New Mexico, or making lasting contributions to New Mexico's life and culture. After 1821, the American presence, with increasing trade relations, gradually turned New Mexico's focus of interest from Mexico on the south to the United States on the east. More and more American citizens became New Mexicans, and as was often the case in other areas, the flag of the United States soon followed the people. When Stephen Kearney arrived in 1846 at the head of an invading army, the citizens of New Mexico chose not to resist this new force, and New Mexico was quickly incorporated into the United States. With American occupation, both good and bad influences came to the ancient land of Cibola. The Anglo-Americans brought capital and technology, two desperately needed items. They brought increased trade with few, if any, restrictions—a boon to New Mexico's faltering economy. They brought a dynamic, ambitious, aggressive and Protestant culture—one that looked down on the quiet, conservative, pastoral and Catholic Spanish and Indian cultures. They came to dominate—and they dominated. The new culture was a disruptive force. With the Americans came a new legal system the Spanish population found hard to understand. Land ownership was thrown into a state of confusion leading to misunderstanding, fraud, and bitterness. What chance did organized mining have under these circumstances? Obviously, little.

As Mexico emerged as a nation following her successful bid for political independence, she was faced with almost insurmountable problems. The people of Mexico (which, remember, included New Mexico until 1848), had no experience in self-government; they were a product of an authoritarian Spanish system which allowed a minimum of local initiative. The colonial ruling classes, experienced in managing affairs of state, were loyal Spaniards, and with independence, returned to Spain, leaving a power vacuum in Mexico. The result was political chaos. The administrative machinery broke down, and Mexico was plunged into a period of civil upheaval that lasted through most of the century. Far out on the northern frontier of Mexico, New Mexico was left to her own resources, which were meager at best. The central government in Mexico City,

when one existed, was rarely able to exercise control over the frontier provinces. In New Mexico, Indian relations deteriorated from bad to intolerable. Trade with Chihuahua slackened, forcing more trade over the Santa Fe Trail, and poverty, a way of life for many New Mexicans, became almost unbearable. What chance did organized mining have under these circumstances? Same answer as before: little.

The Apaches, Comanches, Navajos, and other semi-nomadic Indians took advantage of the confusion during this period. They had always resisted the Spanish, although some controls had been effective in the late 18th century. Mexico did not have the capability to exert pressure on the hostile tribes, leaving responsibility for defense totally on local resources. In many areas of New Mexico, this situation gave the Indians a free hand. Only the larger communities had enough manpower, weapons, and supplies to do an adequate job. Nowhere away from settled areas were citizens able to exert much influence over the Indians. The mountains became too dangerous for the white man, and the mineral resources were in the mountains. What chance did organized mining have? Again the same answer, none.

As if there were not enough problems for New Mexico, still another was on its way. After New Mexico became a part of the rapidly expanding United States in 1848, it was drawn into the greatest of all American conflicts, the struggle between North and South culminating in the Civil War in 1861. This cataclysmic political, economic, and social conflict involved every part of the nation in some fashion. New Mexico had her share of problems. Her failure to achieve statehood can be attributed chiefly to the conflict over slavery. Geographically, the Territory fell into that area left open for slavery (south of latitude 32°30′) according to the provisions of the Missouri Compromise of 1820. The Compromise of 1850 left New Mexico free to develop as a slave state, if it so chose. Consequently, statehood for New Mexico, despite the fact that it fulfilled all the requirements, was always blocked in the Federal Congress because of the slave controversy. Internally, New Mexico was torn by conflict growing out of the sectional differences in the nation. Americans coming to New Mexico in large numbers after 1848 from North and South, brought with them the values and political beliefs of their sections. As the Civil War approached, these attitudes led to local differences, further clouding affairs in the Territory. An eventual solution for many of the problems in New Mexico was federal aid, but this did not come until after the Civil War.

Such a gloomy picture! How could mining—which suffered along with all other aspects of life in New Mexico—survive in such chaos? But it did, for man will seek a livelihood, quick wealth, economic benefit, romance and adventure, despite the confusion and uncertainty that surrounds him. The period from 1820 to the beginning of the Civil War is important in the mining history of New Mexico. Not so much because of great productivity or great accumulations of wealth, but because during these years, the people of New Mexico prospected the mineralized regions and generated an enthusiasm that led to significant developments in later years. The period, characterized by a prospecting activity, had all the elements of optimism typical of prospectors around the world. Old mining areas, like Cerrillos and Santa Rita, continued to operate. There were also efforts to open new mines. Details of the prospecting, of the old mines—and the new ones—bring us back into the main flow of our mining history.

The excitement really started in the arid, lonely Ortiz Mountains southeast of Santa Fe, on land granted to José Francisco Ortiz. A sheepherder, a native of Sonora, chasing some of his flock near Dolores Gulch, spotted gold-bearing rocks

and gravels. This was in 1828, and led to an immediate rush into the area, and the founding of Dolores, New Mexico. By rights, Dolores should be more renowned. Its claim lies in the fact that the first gold rush in the American Far West was to Dolores in 1828, 21 years before the discovery of gold in California, and 18 years before the Southwest was occupied by the Americans during the Mexican War. A mining district was laid out around the town of Dolores. Commonly called the Old Placers, this district was an important gold producer in New Mexico.

During the early days in the district, primitive mining methods were used. Scanty water supplies throughout most of the year made ordinary washing techniques impossible. Most of the mining activity was during the winter months, to take advantage of winter snow (melted by heated rocks) as a source of water. Children of the Mexican citizenry benefited from this water shortage; many of them earned small amounts of money supplying the miners with melted snow. During the dry months, water carried from springs or wells many miles from the placers cost about $2 a barrel. Washing was done in a "batea" (wooden bowl) not unlike the American miner's gold pan in shape and size.

Dry washing techniques were tried, and sometimes proved successful when rich pockets of gravel were uncovered. One technique involved placing a quantity of gravel on a blanket, then two men held the corners, tossed the gravel in the air, and allowed New Mexico's reliable winds to carry away the lighter materials, leaving the heavier stones and, hopefully, the gold. Another method of dry washing used the gold pan, or batea, without water. At best, these techniques were poor. Nevertheless, considerable gold was recovered. Most gravels encountered, however, were too moist for dry washing.

In addition to the placers, several lode mines were located when the sources of placer gold were traced to the head of Dolores Gulch. The most famous of these lodes became the Ortiz mine, owned and developed by José Francisco Ortiz. The Ortiz Land Grant included the Old Placers district and Dolores. Shortly after the discovery of the lode in 1832, Ortiz brought in a mining expert, Don Damasio Lopez, to manage the mine. The venture was a success. According to best estimates, the mine yielded 60 to 80 thousand dollars per year for several years—a substantial sum of money for New Mexico during the Mexican period.

Wages for those who worked for claimants were extremely low during the period of exploitation. The wage miner was paid three buckets of dirt or gravel per day; the gold content of this amount of gravel could not have been more than 30 cents. (This kind of wage scale might help account for the profitability of mining during the 1830's.)

Old Placers mining district, like so many others, generated considerable optimism among the inhabitants of the region, particularly in Santa Fe, which saw itself emerging as a great mining center. One visitor to the placers reported, "They never washed any earth valued at less than $25 a pan, sometimes it was $100 a bowl." In most placer operations, dollar pans were considered excellent, and these high estimates of values for Dolores were gross exaggerations based on optimism rather than fact. The dollar value of gold brought out of Dolores was probably considerably less than $2,000,000 during its history.

By the Mexican War in 1846, the district was nearly played out: the placers were abandoned, leaving only the Ortiz mine in operation. But even the Ortiz declined as a profitable enterprise and was eventually sold by the Ortiz family in 1864 to the New Mexico Mining Company. Lehman Spiegelberg, part owner of the famous Speigelberg Brothers Mercantile Company of Santa Fe, reported in 1858 that "the mines were abandoned on account of Indian attacks."

The extent of the operations at Dolores can best be imagined when one knows

the number of people working in the area at the time. An estimated 2,000 to 3,000 miners worked at the placers and in the Ortiz mine between 1833 and 1840. That was a lot of people, considering that the entire population of New Mexico during these years could be counted less than 50,000.

The fact that there was "gold in them thar hills" around Dolores led others to seek elsewhere for the elusive yellow metal. A few miles southwest of the Ortiz Mountains lay the San Pedro Mountains, where a second gold strike was made in 1839; again the rush for gold was underway. The not unlikely name of New Placers was given to the district, and the mining camp of Tuerto became its center.

The New Placers, like the Old Placers at Dolores, lacked water. Because the closest source of water was at Tuerto, one mile northeast of the goldfield, getting water to the mines involved almost as much effort as digging and washing the gravels. Despite the fact that a considerable quantity of gold was produced over the nearly 20 years of mining activity around Tuerto, seldom did an individual accumulate any surplus wealth. Most miners worked hard and led a difficult life, as did their families. Lieutenant J. W. Abert of the United States Army, who came to New Mexico in 1846, visited New Placers and gave this description:

> *Around little pools, men, women, and children were grouped, intently pouring over these bags of loose sand, washing the earth in wooden platters or goat horns. One cannot but feel pity for these miserable wretches, and congratulate himself that he does not possess a gold mine. Even the life of the poor pastores is much preferable to that of these diggers of gold.*

The New Placers and the town of Tuerto were most active during the decade following discovery. At its peak, the district probably had as many as 5,000 miners. But activity dimmed rapidly in the late 1840's, and Tuerto died, thus becoming one of New Mexico's first mining ghost towns.

A short distance north of the Ortiz Mountains, coal mining developed during the boom days at Old and New Placers. Fuel for the "vassos," or adobe furnaces used to smelt some of the ores, was constantly in demand, and while piñon and juniper were available, some coal was used. Although the operation was never extensive, we can establish coal mining in the vicinity of the modern ghost town of Madrid by 1835.

These were exciting times in New Mexico: two gold rushes within 10 years of one another, both within a few miles of Cerrillos, played a significant role in the mining history of the Spanish period. What was the impact of these first bonanzas on the emerging Territory of New Mexico? The several million dollars in gold won ever so slowly from the Old and New Placers by the tedious work of thousands of Mexican and (later) American miners, proved to be an important source of wealth for New Mexico. Not only did it provide a source of day wages for a people who had been poor for centuries, but it flowed into the hands of the shopkeepers, the whisky dispensers, the gamblers, the ladies of the night, and other businesses, who in turn, made their purchases in the larger commercial centers, such as Santa Fe and Albuquerque. In those centers, the gold found its way into the banks to become a pool of much-needed investment capital. The fact that the total amount was not large in terms of other parts of the nation did not diminish its significance to New Mexico.

Both mining districts supplied a large number of New Mexicans with wages far in excess of anything else available. The wealth was not produced by great mines in the modern sense, in which a company supplies large numbers of jobs for miners. Only the Ortiz mine in the Old Placer district fitted this image on a small scale. Most of the miners in these camps were independent, applying their own

labor to their own claims, the proceeds going into their own pockets. The fruits of their labor were not great. They were, however, able to earn wages adequate to the time, probably comparable to wages paid for labor in other parts of the country.

So, despite the fact that few miners ever became rich from the gold-bearing gravels of the Old and New Placers, the aggregate wealth produced by these districts gave New Mexico an important shot in the arm at a time when she needed help.

Beyond the exciting strikes and rushes in the vicinity of Cerrillos, only one other case of serious mining occurred during the years 1820 to 1860. At Santa Rita, which you will recall was so important as a copper producer in the last years of the Spanish Empire, mining activity continued in a sporadic fashion. This area was plagued with problems that made development difficult: lack of adequate transportation and distant markets made operation of the mine costly; poor management, along with inefficient mining and smelting methods added to the problem. Most important was the constant danger of Indian attack, for Santa Rita lay in the midst of Apache country. During the years preceding the Civil War, these sons of the desert were unchallenged away from the major population centers. The Apaches were particularly interested in the animal herds connected with mining; both horses and mules were prime prizes and incentives for raids, while cattle and sheep were secondary, though not immune from Apache appropriation. Guns and ammunition were also prime targets. If time permitted and resistance were not too great, any item of value for trade went with the raiders. Until the United States Army moved into New Mexico in force after the Civil War to protect the miners and settlers, mines in the hinterland were simply too difficult and dangerous to operate.

Despite the dangers and problems besetting Santa Rita and its environs, several attempts were made to mine copper in the area. In 1809, with the death of Francisco Manuel Elguea, founder and owner of the mine, his heirs contracted with Juan Onis to work the property. In 1825 Onis leased the Santa Rita to two Americans, Sylvester Pattie and his son, James O. Pattie, for a reported price of $1,000 per year. The Patties were in the vicinity for several years and prospected the area around Silver City, in addition to working the copper deposits at Santa Rita. In 1827, they abandoned mining in the region due to threatened Indian attacks, and continued on to California. The Pattie expedition into New Mexico and thence on to the west coast was one of the earliest American penetrations across the Far West. They were the second American party to cross the continental United States into California, preceded only by the famous mountain man and fur trapper, Jed Smith.

When Pattie moved on and abandoned Santa Rita, the mine was leased by the Elguea family to a Frenchman from Chihuahua, Estevan Courcier. Observers who visited and wrote concerning this period in the history of Santa Rita indicate that Courcier was a successful, imaginative Frenchman who not only did a good job operating the mine, but saw the need for developing other aspects of the country. He organized and supplied a colony of 100 families at the mine; he also supported settlement of the Mimbres Valley, 9 miles east of Santa Rita, and the opening of farming there to produce wheat and corn to feed the miners. He imported all other supplies from Chihuahua by wagon once a month. He invested considerable capital in the copper-mining enterprise and dominated the copper markets in Chihuahua from 1828 to 1834, when he was forced to withdraw his operation in the face of increasing Indian attacks.

After Courcier, the mine came into the hands of Robert McKnight, who leased

it from the Elguea family. Little is known about this operation, though some copper was produced. The Village of Cobre was occupied, and according to one source, "orchards of peaches and apples were planted" and seeming comfort was apparent. McKnight gave up his interest about 1837.

Following McKnight, a number of others operated the mine up to 1860, but Indian attacks, difficulty of transportation, shortages of supplies, and distance to markets (the copper matte was shipped to Durango for final smelting) made profitable operations difficult. From its origins in 1804 through 1860, only three periods at Santa Rita stand out as prosperous. The original owner, Francisco Elguea, did very well for a few years, 1804 to 1809. The Frenchman, Courcier, is said to have cleared nearly $500,000 during his 6 to 7 years at Santa Rita, probably the best production and profit shown prior to the Civil War. Apparently, McKnight made some money from the mine, although such an assumption is based on flimsy evidence. From the beginning of the century to 1860, the region around Santa Rita del Cobre was primarily a mining region and any parallel or subsequent development was due to mining activities. When the mining boom came in the 1870's and 1880's, this part of New Mexico was ready, due to its long heritage of mining activity, and because its mineral resources were well known.

The prospector takes up the rest of our story in the period 1820 to 1860. Without the lonely prospector to roam the hills, to search out a thousand canyons, to check every outcrop—leaving the wilderness ringing from his searching hammer—no mining regions would have been developed. There would have been no rushes and no roaring camps. Trying to piece the story of prospecting together is a most difficult process. Most prospectors of the early West, New Mexico in particular, were not noted for literary talent. New Mexico did not possess a great center of population where men capable of literary comment, such as newsmen or teachers in the universities, could describe what was taking place. Sources on the mines and their production have a certain reliability and can usually be checked in several places, but prospecting and the results of this art are vague and uncertain. It is a speculative art, full of optimism, dreams, and great expectations. Remember, the god of prospecting is Billican, the imp of good luck.

In south-central New Mexico, important mineralized districts were prospected early. The area was easily accessible due to its proximity to the Rio Grande valley. Most of the "strikes" were in the Organ Mountains, east of the Rio Grande. In 1849 the Stevensen mine was discovered among these spired peaks. Hugh Stevensen worked the area for 10 years; reports, probably exaggerated, indicated that the mine produced about $90,000 in values. Other areas in the Organs were prospected. A lead vein at the head of Soledad (Fillmore) Canyon was worked to a small degree; a small adobe furnace was used to reduce the ore. This latter deposit became an active mine later in the century, and was known as the Modoc. Other prospects were opened in the Organs, but like the Santa Rita area, Indian problems made mining a losing proposition, and by the beginning of the Civil War, little activity was visible.

One cannot leave the lofty, rugged Organ Mountains without a lost mine legend. Like many legends in New Mexico, this one has its origin in the Spanish period. Father LaRue, an hacienda priest in northern Chihuahua, was told by a dying friend that placers and a fabulously rich gold-bearing lode were located in the mountains to the north of El Paso del Norte. A drought endangered the community at the hacienda, and Father LaRue persuaded his people to join him in a search for the mine. They penetrated the Organ Mountains; there the priest

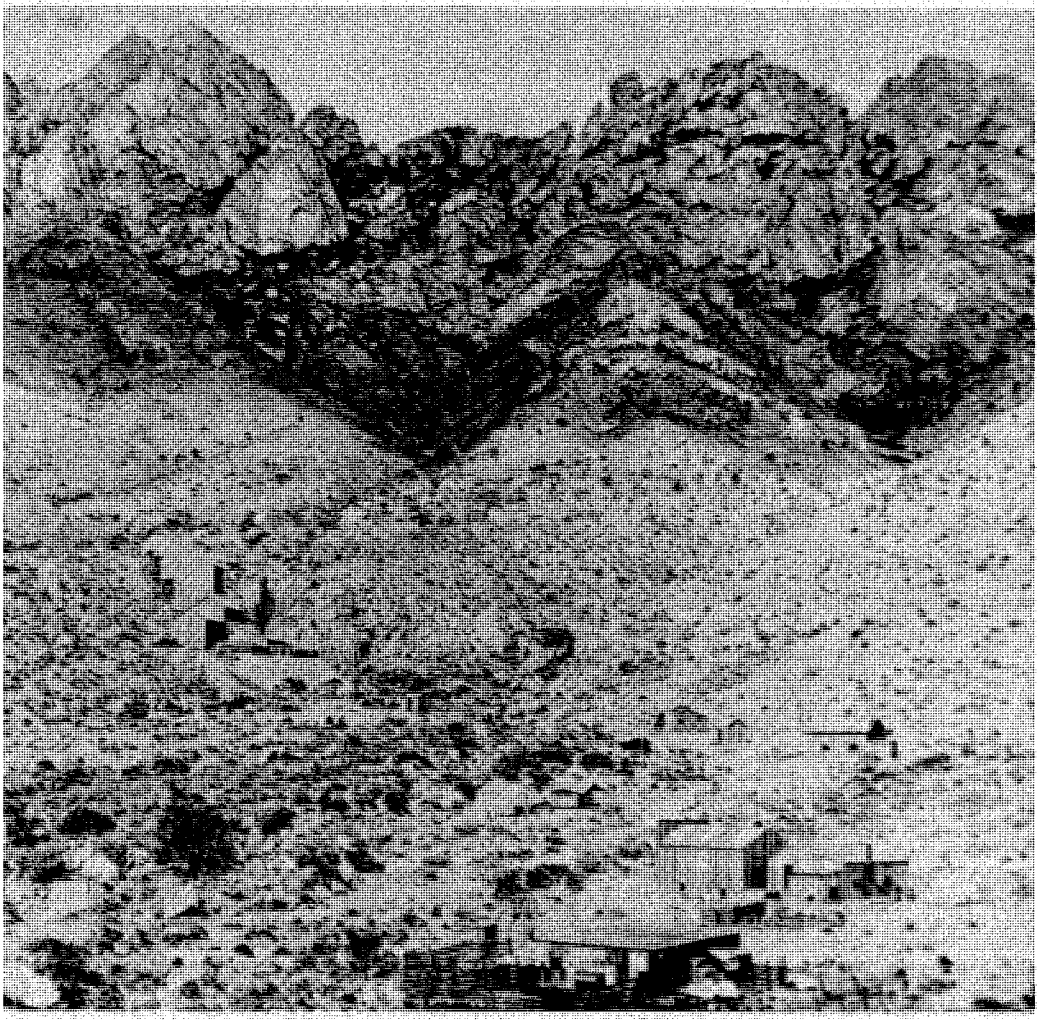


Photo Collection, Museum of New Mexico

MODOC MINE, ORGAN MOUNTAINS, 1904. NEAR SITE OF STEVENSEN MINE, ONE OF EARLIEST IN NEW MEXICO.

found the landmarks that guided him to the rich deposits. The priest and his people founded a village at Spirit Springs, and mining began. The ores were treated in arrastras, smelted in vassos. The gold recovered was then stored. Church authorities in Mexico City became concerned when they did not hear from LaRue, fearing Indians had attacked the hacienda. An expedition was sent to investigate. Finding the hacienda, the officers in charge traced LaRue and his followers to the Organ Mountains. As the expedition approached the village, LaRue ordered the mine covered up and the gold hidden. When the expedition arrived at the village, they asked to see the mine that had brought LaRue and his villagers so far out on the frontier. LaRue declined, claiming the mine and the gold belonged to the people, not to the church or the state. That night, greed and avarice overcame some members of the expedition and LaRue was tortured in an effort to make him divulge the location of the mine. He stood firm, and was

murdered for his silence. Some of the villagers were also tortured, but the secret was never told. The people were forced to return to the hacienda, the village was abandoned, and the location of the mine lost to memory. Periodically, rumors of the lost mine return to the Organ Mountains, and though extensive searches have been carried out, no trace of it has ever been found.

Another important prospecting area during the period before the Civil War was in the vicinity of the Jicarilla Mountains, just north of modern Carrizozo. Two important mining districts developed out of the early discoveries: the White Oaks district on the southern end of the mountains, and the Jicarilla district, in the northern part of the range. In 1850, placer gold was discovered in the streams and dry washes of the northern part of the mountains. In succeeding years until 1860, a few miners worked the deposits on a small scale. Farther south, in the vicinity of Baxter Mountain, near White Oaks, another strike was made in 1850; this one by a group of cowboys chasing stray cattle. Both districts had been prospected by 1860, and some placer gold was removed, but in neither case were any lode mines discovered. The Jicarilla Mountains mines waited until the 1880's for their flowering.

The theme remained constant and the dream intense: New Mexico was rich. From Dolores and Tuerto, from Santa Rita, from the Jicarilla Mountains, and from the Organs, the testimonials from miners and prospectors poured out to a waiting populace: "The wealth is here, we have found it." Dollar pans of placer gold, veins of lead, and copper for the world were all there for the brave and the hearty. Even the restless ghost of Father LaRue proclaimed the certainty of a bonanza. But other forces took precedence. The Indians cared little for the yellow metal that drove the white man into a frenzy. They needed horses and food and freedom, and prospectors roaming the mountain wilderness were easy game. Capable miners were reluctant to ply their trade in the face of the Indian menace. The Civil War was brewing, and the federal government was unable to supply the West with the troops necessary to stop Indian raids. The politics of the Civil War subdued even the ardent prospects of the miners; the development of the minerals of New Mexico had to wait another time in history. More myth and legend than ores and ingots occurred in New Mexico mining history.

Decade of the Sixties—The Door Opens

The Civil War came to New Mexico in 1862, and with it, patterns of life in the territory changed. The minerals buried beneath the land of Cibola were nearly forgotten in the deluge of political rhetoric and the rumble of war. The conflict in New Mexico, and indeed the whole of the western states, was small in comparison with the titanic struggle that unfolded from the Mississippi valley east to the Atlantic. Few battles were fought in the West, few men were available to fight, and the stakes were smaller. But the bitterness, the hatred, the intensity and the spirit were there in full measure.

New Mexico was the center of the war in the West. What circumstances existed that made a battleground out of the Rio Grande valley? One might think the civilian population of the Southwest had problems enough just staying alive because of Apache and Comanche threats to take on more conflict. Such was not the case, however, for the bitterness that gradually developed among the people throughout the eastern half of the United States had its counterpart in New Mexico. One had to be Southern or Northern, Seccessionist or Union. In addition, New Mexico Territory included all the land between the western border of Texas and California, and from Mexico to the Colorado-Utah border—an important piece of real estate to control. Texas joined the Confederacy; and southern California seemed ready to do the same. To the Confederacy, New Mexico was the link that would give the South continental proportions. To the Union, control of New Mexico meant keeping the South confined and divided.

In addition to the national issues involved, local conditions helped bring the war to New Mexico. Fighting and conditions of war were not new to her people. For several centuries, New Mexicans had been engaged in a death struggle with the Apaches, and after 1846, when the Americans arrived, an intense effort was made to defeat the stubborn Apache resistance. As a result, a number of forts were built throughout the territory, staffed with soldiers, and supplied with the materials of war. The more important among these were Fort Filmore near Las Cruces, Fort Craig just south of Socorro, Fort Stanton, Fort Union near Las Vegas, Fort Wingate east of Gallup, and a series of forts in Arizona. The South desperately needed the guns, ammunition, and other war material stored in these forts.

A prime factor influencing both sides was the mineral wealth already under development in Colorado, and broadly hinted at in New Mexico. Neither contestant in the conflict had adequate bullion supplies to support their war efforts. The South was particularly in need of gold and silver to purchase war materials from foreign markets. The mineral wealth of the West was well worth fighting for.

Still another consideration—Texas had long coveted New Mexico Territory east of the Rio Grande. The Texas Republic made this claim, as did the state of Texas. Several unsuccessful attempts were made to bring this area under the domination of Texas. In 1862, a Texas army carried out the invasion of New Mexico in the name of the Confederacy; the old claim of Texas was an important factor in prompting this invasion.

The Civil War in New Mexico, in its main stages, lasted only a few months. There were two battles. The first, the battle of Valverde, February 21, 1862, fought 6 miles north of Fort Craig, was a Confederate victory that led to the quick occupation of Socorro, Albuquerque, and Santa Fe by the victorious forces from Texas. The second, fought at Glorieta Pass east of Santa Fe, near modern Pecos, on March 28, 1862, was a decisive victory for the federal troops from Fort

Union, aided by volunteers from Colorado. Confederate supplies were destroyed, and the Texans were forced to withdraw down the Rio Grande and eventually out of New Mexico.

All these hostilities deterred the development of the mineral industries in New Mexico. Military forces, brought in before the war to quiet Indian raids, were used for fighting the Confederate invasion. This removed the pressure on the hostile Indians, and their raids began to increase, making the mountain regions again dangerous for general mining or prospecting activities. Also, demands by the armed forces of both sides depleted civilian capital goods such as livestock, wagons, hardware, and food reserves. The formation of a New Mexico militia to combat the Texan invasion took some of the labor force. The overall effect set New Mexico back several decades in terms of economic growth and capital accumulation. One contemporary observer put it this way: "The destruction caused by the Texas invasion in 61-62 had a most disasterous effect upon this country. The invaders consumed its substance, caused the loss of almost its entire mining capital, and much injured the agricultural interests." The works at Santa Rita deteriorated, as did those at Cerrillos. The Stevensen mine in the Organs lay idle; the important gold discoveries in the Jicarilla Mountains were speculated about, but remained undeveloped. Even the myths, legends, and talk of lost mines gave way to the demands of the Civil War.

With all the problems, the miners and prospectors remained undaunted. Except for the actual years of the war in New Mexico in 1861 and 1862, they continued their search. Mineral exploration and mining had four aspects during the period from 1860 to 1870: The first was a propaganda effort, conscious and unconscious, by a number of people; the second was the continuation of earlier mining efforts through the war and to the end of the decade; the third was the discovery of new deposits and their development as significant mining operations; and the fourth was a massive prospecting effort that resulted in the discovery of numerous mineralized areas, many of which became important mining camps in later years.

The end of the fighting in New Mexico ushered in an exciting period in the search for mineral products in the territory. The population of the area, always small during the Spanish and Mexican periods, grew rapidly following the war. Much of this growth resulted from people migrating from eastern states seeking their fortunes in the West. Some came for land, others saw opportunity in trade and commerce, others came to prospect for that illusive yellow metal hidden in the stream gravels or in sparkling veins in the rugged canyons of New Mexico. Most of those who came were ordinary people seeking a livelihood from their own labor. Others came officially, representing various government agencies interested in compiling as much data as possible for an interested nation. A few were curious travelers, writers, or journalists, who wanted to bring the color and romanticism of the Southwest to the American people. The information collected and published by these men had a stimulating twofold effect on mining in New Mexico Territory. First, it described the mineral resources of the territory, as well as climate, topography, economy, flora and fauna—some of it in dull, dry, official language, some in flowing, dramatic prose. Second, all the information exaggerated—sometimes extravagantly—the richness of the mineral resources of New Mexico. These authors listened to and perpetuated the legends of great wealth in the Spanish period, such as the Lost Mines of the Aztecs, and frequently reported these legends as fact. They incorporated into their writing all the optimism of earlier periods, picturing New Mexico as a fabulous mining frontier, equal or superior to anything that had yet appeared in the American West.

In 1866, Dr. W. H. McKee published a book entitled, *The Territory of New Mexico and Its Resources.* One section was devoted to mineral wealth and the mines he saw or heard about in his travels through the territory. After discussing a number of specific mines and the mineral rich regions, he came to the following conclusion:

> *Already Nevada's product of the precious metals equals in value that of the far-famed and world-renowned California, and yet not one-fourth as many persons are engaged in mining operations in Nevada as there are in California. Idaho, Montana, Utah, and Arizona all yield largely of the precious metals, and Colorado gave $10,000,000 and upwards on an average each year for the three years of 1861, '62 and '63.*
>
> *New Mexico will yield equally as much, or even more, for the metals are known to exist within her in the greatest abundance, and capital only is required to develop the hidden treasure.*

Yes, it must be the fabled island of Antilla with its seven golden cities, the land of Quivira and the location of the mountain of silver, all wrapped up in one. Come to New Mexico, you eastern men seeking adventure and easy fortunes; come you men of capital, here one will find a theme for glory! Rich as California? Indeed! California produced as much gold in any one of her best years as New Mexico produced in her whole history.

The build-up was continued in a volume published by the United States Treasury Department, *Statistics of Mines and Mining in the States and Territories West of the Rocky Mountains* (1870), and certainly such an agency of government and such a title must be reliable. The official reporter, while discussing the late 1860's, said:

> *Indications of placer gold are very general all over New Mexico, and I believe that with the introduction of hydraulics this interest will become a very prominent one in the future. Color can be found anywhere in those regions where the older rocks are the underlying formation or where they are adjacent to the gulches. Even in the very City of Santa Fe color can be got.*

And finally, regarding mineral resources, this official report concluded:

> *Sooner or later, however, it will be known that New Mexico need not shrink from a comparison with her sister territories; none of them surpass her in natural resources and riches, and many of them stand below her in rank.*

In 1868, the Commissioner of Public Lands added his bit to the accumulating lore about New Mexico and her mineral wealth. In his annual report he said:

> *Valuable minerals are found in every portion of New Mexico. In numerous localities may now be seen shafts and drifts, the work of former generations, and the only monuments left of their energy, activity, and industry, while the almost daily discovery of new lodes of gold and silver-bearing quartz and auriferous placers indicate that mining operations in the future will be as productive as in the past (as in the days of Montezuma and Cortez).*

One final report could not be ignored, for it went much farther than the rest; the words must have stirred excitement in those who read it. Let the words of a professional geologist written for the Land Commissioner in 1869 speak:

> *Evidences that the gold and silver mines of New Mexico which occupy the entire valley of the Rio Grande are perhaps the richest in this country is shown not only by the exceedingly rich ores now deposited in our collection, but also in the past history of that part of old Mexico under the Spanish dynasty. In past times hills and valleys of New Mexico had a flourishing population and the old maps show two or three major towns to one small village at the present. These people were the thriving and contented miners of that region before the*

commencement of the troubles of Mexico originating in the expulsion of the old Spanish rulers. The yield of gold in our specimens frequently runs from 300 to 500 dollars to the ton of ore, but a few specimens from the headwaters of Ute Creek (a tributary of the Cimmaron) show by assay the enormous richness of $19,640 to the ton. By many experts who have visited the mines, it is believed that the value of the silver deposits exceed that of gold.

With these kinds of reports flowing out to the world, no wonder an influx of people and capital pushed into New Mexico to take advantage of the gold and silver that was everywhere in vast quantities. Few questioned these reports, despite the fact they were based upon the flimsiest of evidence, and in many cases, upon hearsay and fantasy. Nevertheless, the formal reports—and the informal ones passed on by private individuals—had a profound influence on mining development in the territory, and ushered in a romantic and productive period in its mining history.

The end of the Civil War did not end all the problems the territory faced. Various hostile Indian tribes continued to plague New Mexico. Increasing demands on the part of the citizens, plus the official belief (based upon reports like those discussed above), brought more and more military power into the territory to deal with the Indian problem. While the problem did not end until 1886, with the final capture of Geronimo, there was marked improvement as the 1870's and 1880's unfolded. Danger to the prospector or miner remained, but his chances for success increased.

The older mining areas—those with proved mineral deposits—again lured the prospector and miner. In the Cerrillos area, mining in both the Old and New Placers was continuous, although intermittent following 1860. The quantity of gold mined never equaled that produced during the early, exciting days following discovery. The *Rocky Mountain News* reported in late 1861 that the Cerrillos district was active, but that water was scarce. Similar reports about placer operations appeared in 1866, again indicating water shortages. Also in 1866, some work was being done along the quartz veins in the Ortiz and Cunningham lodes. The *St. Louis Democrat* of January 11, 1867, stated:

Dr. Steck of the Placer Mining Co. of New Mexico arrived on Friday last with a considerable amount of gold dust; he left an order for a 10 stamp mill. These mines (Cerrillos district) have been worked at times for some 150 years. The present association is the result of efforts commenced five or six years ago, to establish a company for the re-opening of the old works. Other lodes have recently been discovered in a westerly direction from this point, which give evidence of richness.

While activity was evident in the old districts, few, if any, of the miners or the companies were successful. At best, panning when water was available might produce average or below-average day wages for the miner willing to work long enough hours. A resurgence of productive mining activity came after new discoveries of gold and silver were made in 1879.

When the Civil War erupted, the Santa Rita mines, along with those at Hanover, were yielding several tons of copper per week and employed several hundred miners. This copper was shipped to Port Lavaca, Texas, where it was transshipped to smelters for refinement. The sudden takeover of Texas by the Confederacy caught 300,000 pounds of this copper at Port Lavaca. Using this copper produced in New Mexico, the Texans established two cannon foundries, each with a capacity of two pieces per week. The limited supply of copper and the other metals necessary for the alloy made these ventures short-lived. Never-

theless, New Mexico copper in the form of cannon may have played a role in some of the famous battles of the Civil War.

The mines at Santa Rita and Hanover, a short distance away, did not produce much during the sixties. Constant Indian problems, lack of capital, and reduced quality of the copper ores made both areas less attractive. The excitement over gold and silver strikes also drew attention away from the less glamorous copper.

The old mines in the Organ Mountains were idle during the sixties. They were in the region held longest by the Confederates, and ore grades were not high enough to tempt miners when new and richer camps were emerging around the territory. Prospecting, of course, continued in the Organs, but with little success.

Thus, the ancient diggings at Cerrillos, Santa Rita, Hanover, the Organs, and others, had only casual mining activity during the early years following the Civil War. They had, however, done their job well. They produced some great wealth and a lot of optimism; they helped create the feeling that small-scale mining in the past was the basis for bonanzas of the future. They strengthened and renewed the basic theme of New Mexico mining.

And if the dream was not strong enough in its own right, a number of new mining areas were opened after the Civil War giving an aura of reality. They represented more than simply new discoveries, for their richness many times exceeded earlier discoveries. The new strikes generated an excitement that drew miners and adventurers not only from all points in New Mexico, but from all of the United States and even the world.

A band of Ute Indians led to the discovery of gold in the Moreno Valley country of northern New Mexico. The Indians, while trading at old Fort Union near Mora, offered native copper in trade—copper they had picked up high on the slopes of Baldy Mountain. In 1866, W. Kroenig and W. Moore saw some of the copper, and paid the Indians to lead them to the location. This led to the founding, near the summit of Baldy Mountain, of the famous Mystic mine by Kroenig and Moore. The partners sent three men, Pete Kinsinger, Larry Bronson, and another named Kelly, to do the assessment work.

Washing with a pan down on Willow Creek (one of many draining Baldy Mountain) to while away leisure time, Kelly unexpectedly brought forth the gleam of yellow metal. He shouted the discovery to his companions. In a few moments the three were panning the creek bed. All were successful. The copper was quickly forgotten as the magnitude of the gold discovery became known.

Winter was coming on, however, and the miners were not equipped to do placer mining. They talked it over, planning to go into Fort Union and return to the mountains in the spring, letting only a few friends in on the secret. They carefully located a "discovery tree" to guide them to the strike on their return.

But whoever could keep news of a rich gold strike secret through the long winter months? Either the three discoverers or a friend talked too much. Before spring had come, Willow Creek Gulch was swarming with prospectors. Larry Bronson and his partners made the first location from the discovery tree; Lynch and Tim Foley took nearby claims, and the mining rush to Baldy Mountain was on. Stories of subsequent discoveries all along the slopes of Baldy tumbled out to an interested world in the months following. Willow Creek quickly filled up with miners, and every foot of Humbug and Grouse gulches was taken up in claims. The Spanish Bar was laid out on the banks of the Moreno River. The district was becoming heavily populated, and the folds of the hills were crowded with men frantically panning gold.

With all the hectic activity and confusion, it was time for a town to be built.

The new settlement was named Elizabethtown, after the oldest daughter of John Moore, one of its founders. E'town, as it was soon nicknamed, became a town of tents and log cabins and rough lumber shacks almost overnight. In 1869 and 1870, the boom was at its peak: Elizabethtown had a population of about 2,000, and another 2,000 lived in the immediate surroundings. By late 1870, the population reached 7,000.

Water for washing the gravel was a major problem facing the miners working the gulches of Baldy Mountain. Tom Lowthian had channeled water by ditch to his claim in Grouse Gulch. The Michigan Company and the Spanish Bar miners had ditched off from the Moreno River and Comanche Creek. Still, the water was not sufficient to handle the volume of gravel being washed as the population increased rapidly in 1868. The largest flowing stream near Baldy Mountain was the Red River, just to the west across the mountain passes. A decision was made to dig a ditch from the Red River to Moreno Valley to supply adequate water for the miners. In early 1868, Lucien Maxwell, W. H. Moore, Valentine S. Shelby, William Kroenig, M. Bloomfield, and Capt. N. S. Davis formed the Moreno Water and Mining Company that constructed the "Big Ditch."

Work began on the ditch on May 12, 1868, with as many as 420 men employed at the peak of construction. This amounted to nearly half the able-bodied men in the region. The first water flowed to Martin and Scott's claim in Humbug Gulch on July 9, 1869.

The length of the ditch from the Red River to Grouse Gulch was over 41 miles, requiring 3½ miles of aqueducts and side-hill flumes. The greatest distance spanned by one aqueduct was nearly half a mile, over a valley 79 ft deep at the center of the span. This aqueduct was located at the divide between the Red and Moreno Rivers, the former flowing into the Rio Grande, the latter into the Canadian and Mississippi Rivers. For the first 12½ miles, the fall was 12 ft, the width at the bottom of the ditch 2½ ft, and at the top, 5½ ft. It was 2 ft deep. For the remainder of the way, the fall was 4 ft per mile, the width 4 ft at the bottom, and 7 ft at the top, and 2 ft deep. For 5 miles, the ditch had to be blasted through solid bedrock. Tunnels were not required, but several cuts up to 10 ft deep were made in the rock. The actual distance between the head of the ditch on the Red River and Grouse Gulch was only 11 miles, yet it took a difficult, circuitous route of nearly 42 miles to deliver the water. The ditch cost $210,000. The building of this ditch, high up in the rugged Sangre de Cristo Mountains, is a tribute to the industry and initiative of the mining men of the Far West.

The ditch was designed to deliver 600 miner's inches of water (about 1,050 gallons per minute) to the Moreno Valley. In its best days it managed only 100 inches, or 175 gallons per minute—frequently less. Seepage, evaporation, and constant problems with the flumes caused the company operating the ditch to fail. It passed through several hands and finally into disuse. While a few miners utilized Red River water to wash gold from the gravels of Moreno Valley, the ditch never did what the builders had hoped. *The New Mexico Miner* of June 15, 1900, carried the following epitaph to the Big Ditch: "The Lynch Ditch, which carries the water from the Red River to the Moreno placer mines at Elizabethtown is to be sold next month at a sheriff's sale to satisfy a judgment and cost aggregating to $7,000."

In addition to the placers of the Moreno Valley, lode mining was also important around Elizabethtown. On a spur running off Baldy Mountain, near where the mountain separates from South Ponil Creek, a deep depression was found in 1868 containing rotted quartz that shimmered with gold. This important lode was located on the Maxwell Land Grant; and Lucien Maxwell, along with

the discoverers, began to develop a mine. Known as the Aztec, the mine produced as much as $21,000 a week during the first two years, and over $1,000,000 by the end of the fourth year. By 1872 the main ore body at the Aztec was worked out. Although it produced more gold as years wore on, it was involved in constant litigation and never was an important gold producer after the first few spectacular years. Other lode mines developed on Baldy Mountain, but none had the success of the Aztec.

Was the Aztec really rich? *The Santa Fe Gazette* reported in October 1868, that the certificate of assay of a piece of rock from the Aztec lode near Maxwell's house was the biggest thing in the assay line they had ever seen or even heard of. Here it is: gold, $19,455.37 to the ton; silver, $189.88 to the ton; total of both, $19,645.25 to the ton! Miners flocked in by the thousands.

It was not all this pretty around Elizabethtown, however. In February 1868, a letter to the *Mining and Scientific Press* said about the E'town district, "I understand that someone has written about the good prospects here. The best prospects I have seen here is about 15 cents to the pan. Most of the claims pay from one to two cents to the pan. Water is scarce." In May 1868, Henry Monson wrote "There was nothing better at E'town than existed in Colorado, and the placers are not very attractive but there were some fair lodes which held him in the district." He said that wages for good miners were $1.50 per day. That same month, another letter stated "great disappointment and disgust with the placers in the Moreno Valley and many miners are leaving as glowing reports of wealth turn into failure."

The truth of the wealth of Elizabethtown lies somewhere between these extremes. A rich district for a brief period in the late 1860's and early 1870's, an estimated $2,000,000 worth of gold was produced in its placers, and perhaps as

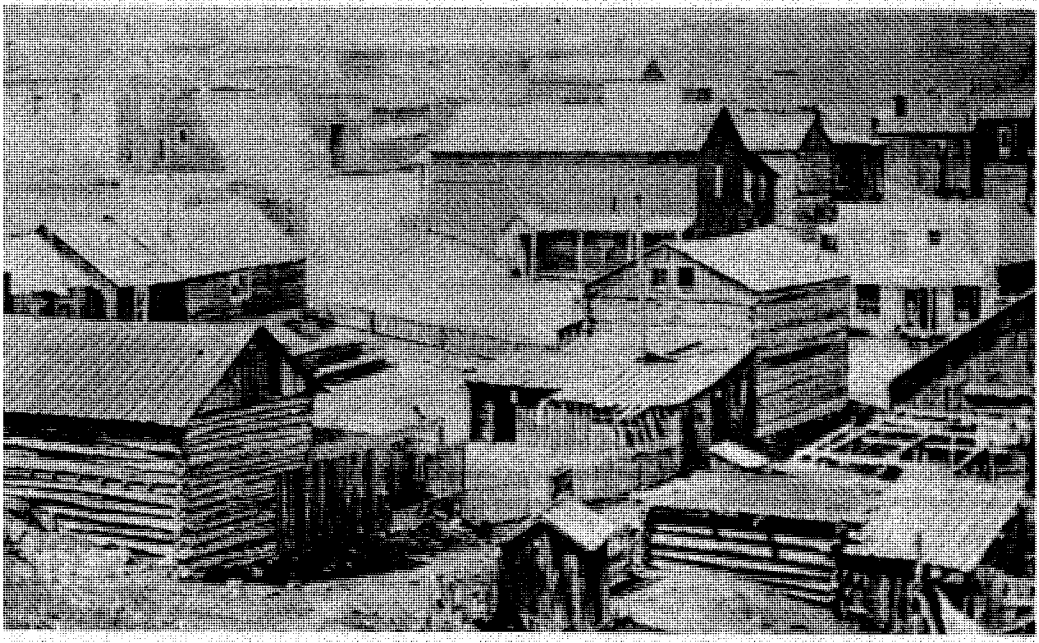


Photo Collection, Museum of New Mexico

ELIZABETHTOWN, NEW MEXICO, CIRCA 1880.

much more in the lodes. For New Mexico, that was a fabulous amount—more than had ever been seen in so short a span of time.

Now let the scene shift from northern New Mexico to the southwestern part of the territory. In 1859, at the abandoned site of the old Mexican village of Pinos Altos, a group of 49'ers drifting back from California discovered gold. Santa Rita was the nearest settlement where they could get supplies. There they went, and while in the copper camp, confided the news to the Marston brothers and a man named Langston. Word spread like wildfire, and by September, 700 men were working the placer. The camp was called Birchville—after one of the founders of the placers. Miners rushed in from California, Texas, Missouri and Mexico. In December 1860, the first quartz vein, the Pacific, was located by Thomas Marston, who sold it to his brother Virgil in the spring of 1861. It seemed as though the new gold camp was off to a good start. However, disaster struck in September 1861, when an Indian attack nearly wiped out the community. Cochise joined the Hot Springs Apaches under Mangas Colorado, who led a band of 400 Apaches in the attack—an all-out effort to rid the country of "Los Godamnies," as the white men were called by the Indians of the region. Thomas Marston led the defense, and the Indians were finally forced to withdraw with heavy losses. Marston died of wounds received during the siege. Depressed by this disaster, most of the miners left, seemingly ending the boom as quickly as it started. Virgil Marston, however, persisted, remaining at Birchville in an attempt to develop the Pacific lode. Still, it was five years before the fear of more Indian attacks was forgotten by the miners, and they began to drift back to join Virgil in his quest for gold. In 1866, Marston chartered the Pinos Altos Mining Company under the laws of the Territory of New Mexico. A stamp mill of 15 stamps, each weighing 700 pounds, was erected by the company. The stamps were hauled by ox-drawn wagons from St. Louis, Missouri. During 1867 and 1868 the operation at the Pacific treated about 1,000 tons of ore a year with a yield of about $35,000. The town, again filling up with excited miners, was renamed Pinos Altos, after the old Mexican village. Both placer and lode mining continued to prosper into the seventies. Because of its location near Santa Rita, in an area fairly well held by the white men, its history as a mining area was better assured. E'town, lost in the mountains, far from people and transportation, did not survive.

While gold was driving men mad at Elizabethtown and Pinos Altos, and generally causing great excitement among the citizens of New Mexico, other mineral products also produced quick wealth for the few. We already know that several fortunes were accumulated at the Santa Rita copper mines prior to the Civil War. A new copper strike in southwestern New Mexico led to another major mining effort in territorial days.

The first discovery of rich copper deposits at Hanover, New Mexico, was made in 1859. There was no vein at Hanover, no vast ore body, but rather the copper was found in its native form—in sheets and lumps. The ores averaged about 35 percent copper. In the early part of the sixties, a reported 1,000,000 pounds of copper was produced. The copper was limited, however, and so was the early history of mining in the region. The coming of the Civil War and the increase of Indian raids in the vicinity closed the mine. It would not reopen until its rich iron and zinc values were discovered toward the end of the century.

West from Santa Rita and Pinos Altos, 4 miles from the Arizona border, another mining district is hinted at in the early records. The Steeple Rock district, which produced significant amounts of gold and silver in the 1880's, may have begun production as early as 1860 possibly even earlier. A military report made from Fort Thomas (Duncan, Arizona) indicated that in 1860, troops were sent to

the Steeple Rock district "to protect the miners from raiding Apache." Early production and the number of miners is not known.

Just south and a little east of Socorro, coal had been mined on a small, local scale in the 1850's. In 1861, it was reported that United States Army troops from Fort Craig had "opened an important coal mining area" north of the fort, the same area worked from Socorro. Thus, the beginning of the famous Carthage coal field that produced considerable tonnage of coal until the middle of the 20th century.

Mines and miners, mining districts and mining camps, and a restless population shifting from gulch to gulch with new strikes was only one side of the excitement of New Mexico mining history in the 1860's. The search was the thing! Some men do not have the desire nor the temperament to spend long hours each day digging even the most valuable ore from the earth. This endeavor takes a special breed of men to enter narrow shafts, to burrow deep into the crust of the earth, to face the dangers of darkness, bad air, and cave-ins—in short, to become hard-rock miners. A special breed of men is also required to leave society, the safety of numbers, the friendliness of the local saloon, and perhaps their families, to penetrate the unknown, the lonely, and frequently dangerous mountains and deserts of New Mexico in search of who-knows-what. Few of the prospectors who first located the mineral wealth of New Mexico ever became the miners or owners of the mining companies that finally solved the problems of profitable mining. During the years following the Civil War, the prospector, around whom swirls the legends and myths—as well as the reality of valuable outcrops—is central to the theme and story.

One shortcoming of prospectors was that they seldom left written records. They chipped away at every likely outcrop, dug into the earth when it seemed worthwhile, and pushed sizeable shafts along mineralized zones. (Many of these prospect holes have been mistaken, in modern times, for mines.) Rarely, however, did they write anything down. Only if they found something promising did they bother to file a claim, leaving a written record of their efforts. Our story of prospecting is based, then, partly on hearsay, partly on historical documentation, partly on reminiscences, partly on physical remains of prospect holes, and partly on guesswork.

Conditions were safe enough (so long as one was wary) after the war years to begin the tedious, yet exciting, job of prospecting the unknown back country of New Mexico. Many of the areas explored during the last half of the "60's" remain unrecorded, for few resulted in producing mines to mark the course of early prospecting. Yet the prospectors of the decade recognized many of the mineralized areas that became significant, even famous, mining camps in later decades.

In 1865, placer gold was found in Dry Gulch, a few miles west of the village of Nogal, and the area came to be called the Nogal district. It lay on the eastern side of the Sierra Blanca, then within the Mescalero Apache Indian Reservation. In 1868, three years after the placer discoveries, lode gold claims were located. In neither case did serious mining take place, and the region remained essentially a prospect until the early 1880's, when the area was withdrawn from the Mescalero Reservation. Even at its peak of activity, only small amounts of gold were produced.

A little to the north of the Nogal district, at White Oaks (10 miles north of Carrizozo), placer gold, first observed in 1850, continued to be prospected. While there were some intermittent placer efforts during the sixties, this area would not blossom as a mining camp until the 1880's—then it would be a good one.

Ben Wittick photo, Photo Collection, Museum of New Mexi

Oldtime New Mexico prospectors, circa 1890.

One of the truly significant prospects of the sixties, and one of the highlights of prospecting in New Mexico mining, was the discovery of silver ore at Pueblo Springs, near Magdalena, Socorro County, in 1863. The silver content was low, and little or no mining took place at the time, but this discovery was one of the first indications that New Mexico might have valuable silver deposits. Gold, however, remained the dominant mineral for the prospector, and silver had to await a more important strike. That strike came in 1866, at Georgetown, in Grant County. The discovery of high-quality silver ores set off a wild search for silver ores all over the territory. It sent silver prospectors back into country already combed for gold.

While some prospectors were locating the first claims around Georgetown, others continued to search the Magdalena Mountains west of Socorro. While no great silver strikes were made, an important lead deposit was discovered on the

western slopes of the Magdalena Mountains by J. S. Hutchinson. This discovery led, in a few years, to the great mining enterprises at Kelly, one of New Mexico's greatest bonanzas. By 1867 prospectors were working the area west of Socorro, encouraged by the proved silver and lead values. In that year, the first discoveries of silver were made in the mountains just west of Socorro, leading to the formation of the Socorro Peak Mining district, which boomed in the 1880's.

In the northern part of the territory, in the region around Elizabethtown, prospectors fanned out in all directions through the high, spectacular Sangre de Cristo Mountains. In 1869 gold, both placer and lode, was discovered in the Red River Canyon, 20 miles west of E'town. About the same time, gold was located in Hondo Canyon, where the Camps of Amizette and Twining were established in the 1880's and 1890's. Neither the Red River nor the Rio Hondo discoveries resulted in any immediate mining activity because low-grade ores, flooding of underground workings by ground water, and disputes with the owners of the Sangre de Cristo Land Grant kept mining at a minimum for several decades.

Thus, the period from 1860 to 1870 saw considerable expansion of mining in New Mexico. The excitement generated by the rushes to Elizabethtown, Pinos Altos, and other discoveries seemed to prove to New Mexicans and other miners and prospectors around the country that all the talk, all the legends, must be true. New Mexico was indeed the fabled land of Quivira. From all directions men converged on the land of mesas, mountains and desert, subjecting its hills and canyons to an exhaustive search that uncovered deposit after deposit of valuable minerals—gold, silver, lead, copper, and coal. During the 1860's, although plagued with all kinds of problems—most of them related to her frontier status—New Mexico still progressed as a potential mining area. More and more of her varied resources became known, and the pace quickened. The legends and the myths were, at least in some localities, becoming reality.

A Genuine Excitement, 1870 to 1880

During the years 1870 to 1880, conditions in New Mexico that previously hindered development of the mineral industries tended to improve. The bitterness following the Civil War waned quickly in New Mexico, and the territory was fortunate to be little affected by the dissentions and arguments between North and South during the period of national reconstruction. New Mexico proceeded to look to her own development in two important activities for which she was best suited: stock raising and mining. That she prospered during the 1870's can be attributed to a number of factors.

Of particular importance was the population increase in this vast territory during the decade. To explore for minerals, to exploit the land for agriculture, or to harvest the grama grasses through livestock, required people. By 1880, more than 100,000 citizens were on the frontier in New Mexico. People brought to the territory more capital, a greater labor force, more demands for federal aid against the hostile Indians, and increased business and banking activity. Evidence of civilized life crept deeper and deeper into the isolated desert regions and the distant mountains of the frontier.

Stock raising rapidly expanded into New Mexico after 1870. The "day of the cattleman" in the history of the American West was a brief but dramatic period lasting from the end of the Civil War into the 1880's. The emergence of the range-cattle industry in New Mexico was an important part of that story and gave to the history of the cattle empire some of its most colorful people and epic tales. The first cattle company, incorporated in 1872 under the laws of the New Mexico Territory, was the Consolidated Land, Cattle Raising and Wool Growing Company. In 1870, an estimated 57,000 head of cattle were on New Mexico ranges; by 1880 that figure had grown to 348,000. This tremendous growth was related to a number of other developments: a growing population in the territory required more food, thus creating a local market; the mining camps, which produced no food, but generally had ample money with which to purchase it, added to the local markets; the increased size and activity of the military establishment in New Mexico required beef, as did the Indians who were brought under their control; and finally, the advancing transcontinental railroads that were approaching New Mexico gave promise of access to a beef-hungry nation. Rapid growth of the range-cattle industry helped a general economic growth in the territory. Much of the capital lost during the Civil War was restored, with more money becoming available for mineral development, both real and speculative. Also, the increased value of cattle, and consequently land, gave cattlemen more power, thus more protection of their interests from the federal government. Troops brought in to deal with Indian raids on ranching areas worked for the benefit of miners and prospectors as well.

Improved communications within the territory, and between New Mexico and the rest of the country aided growth and reduced the isolation that had plagued the region for so long. By 1870, telegraph communication was established between Denver and Santa Fe, linking New Mexico with the national telegraph system. Later in the decade, a military telegraph system tied other areas in New Mexico into the system, and then continued on into Arizona.

Probably the most significant trend that began to evolve in the seventies was the first trickle of eastern and foreign capital into New Mexico. While this trend remained small, it did result in expansion of the stock raising and mining industries. An example of foreign capital was the purchase of the Maxwell Land Grant by a group of British investors. This grant, 1,700,000 acres of patented land

in some of the richest and most beautiful country in New Mexico, included much of the mining area around Elizabethtown. The interests of the British company were later sold to a group of Dutch investors, who operated the Maxwell Land Grant Company until 1940. Most of the foreign capital was invested in mining, cattle ranches, and land speculation. Very few of these were profitable, but they did add to capital investment needed in New Mexico.

The railroad came to New Mexico Territory late in the decade. The Santa Fe reached Trinidad, Colorado, in 1876; Otero Station, Colfax County, New Mexico, in February 1879; Las Vegas, New Mexico, late in 1879, and Albuquerque in 1880. While the building of rail facilities into the territory did not have direct effect on mining and related activities during the 1870's, it stimulated considerable activity in preparation for the anticipated growth in all economic areas.

The Indian problem, which so hindered mining and other economic activities for many centuries, continued as a depressing feature of life in New Mexico. The nature of the problem, however, changed to localized Indian raids. Many of the tribes that had been active in years past were subdued and held on reservations. Most of the Indians of northern New Mexico, the Utes, Navajos, and Jicarilla Apaches, were not a serious threat in the seventies. The Mescalero Apaches in the south were established on their reservation from 1873 to 1874. The Chiricahua Apaches, on the other hand, were not subdued. Victorio—and later, Geronimo—terrorized western and southwestern New Mexico until well into the 1880's. The increase in United States Army activity during the decade was a prime factor in the decline of the Indian threat. Improved communications aided the military. Forces assembled between 1870 and 1880 to combat the Indians made the deserts, canyons and mountains safer for miners and prospectors.

These years mark a period, perhaps the first since American occupation of New Mexico, when the combination of capital, labor, transportation and communication, and relative safety from Indian attack favored the expansion of mining and prospecting. Many of the older mines continued to operate. Some of the prospects uncovered during the previous decade blossomed into roaring camps; prospectors continued their lonely search. An important feature of the mineral industry in the seventies was the variety of minerals that began to interest those involved. Not just gold, silver and copper were sought, but a number of other minerals became important.

In 1870, Elizabethtown, with about 7,000 inhabitants, seemed destined to retain its "boomtown" atmosphere indefinitely. In June 1871, one report states:

> *one week's shipment of gold from Elizabethtown amounted to $2,805.65, from various claims. Matt Lynch cleaned up 37 ounces from one week's run. He got 56 ounces another week.*

Five mining subdistricts were involved in the mine and placer operations. The Moreno district, which included all of the western slope of Baldy Mountain except Willow Creek, was the major producer; the best known mine in the Moreno district was the Red Bandana. On the east side of the Moreno Valley lay the Willow Creek district, where one of the early gold strikes was made that led to the rush into the area in 1868. The best known mine in the district was the Ajax. The Ponil district was just north of Ute Creek, on the northeastern slopes of Baldy Mountain. The French Henry, with a 15-stamp mill, was the oldest lode mine in the district. Fourteen miles south-southeast of Elizabethtown, near the head of Cimarroncito Creek, lay the Cimarroncito district. The district produced values in gold, both placer and lode, and some silver; the Thunder and the Contention were two early mines here. The Ute Creek district, on the flanks of

Maxwell Land Grant Company Papers, Special Collections, University of New Mexico

ELIZABETHTOWN, NEW MEXICO, CIRCA 1870.

Baldy Mountain east of the Moreno Valley, was the most important producer in the region; while there were some placer operations here, this district was really most famous for its lode mining. The Aztec mine, developed by Lucien Maxwell, periodically produced remarkable amounts of gold. The ore body normally gave values of from $5 to $70 per ton, but occasional streaks and chambers were very rich and showed large quantities of wire gold. Other well-known mines in this district were the Montezuma, Rebel Chief group, Paragon, Bull-of-the-Woods, Puzzler, Little Jessie, and the Sweepstakes.

In the first years of the 1870's, several million dollars in gold were taken from the region around Elizabethtown, and word of the success of the goldfields spread to the East. Companies were organized, bigger mills began to appear, and bigger dreams were dreamed, bigger than anything indulged in up to then. With all this extensive development, the palmy first three years of E'town's existence—the time of dollar pans, nuggets, and rich pockets—were never eclipsed.

Two factors came into play forcing the decline of this district by the middle of the 1870's. First, the placers began to give out—quickly discouraging the individual miner interested in working his claim—and many miners left Elizabethtown. The lode claims in the area were difficult to work, and required large amounts of capital. The result was a quick decline in the population. Second, increasing local problems with the Indians of the region discouraged the miners. Finally, the nature of the ores in the lode claims made recovery of the gold a costly process, showing profits only when unusually rich pockets of quartz were discovered. Even the Aztec mine was essentially worked out by 1872, and although a number of people and companies attempted to revive the bonanza days of the late 1860's and early 1870's, the Aztec never again became a significant producer.

When a town has lived as high and flush as did E'town, it is sad when its bloom fades and the town begins to die. In 1881, this eyewitness account was recorded:

> *It makes one lonesome to walk the streets of Elizabethtown. Although not an old place, it is deserted and, instead of the crowded houses, rum shops, gambling saloons, and hourly knockdowns of a few years ago, a sort of graveyard stillness, deserted buildings, and a general tumbledown appearance is everywhere observed. There is one store, part of another, hotel, the tail end of a barber shop, the outside of a Catholic Church, or barn, a good deal of broken glass, and other fragments of former prosperity left, but the pith, the vitality of village life has departed, no more to return.*

Activity around E'town remained quiet until after the turn of the century when new capital tried to revive the old camp.

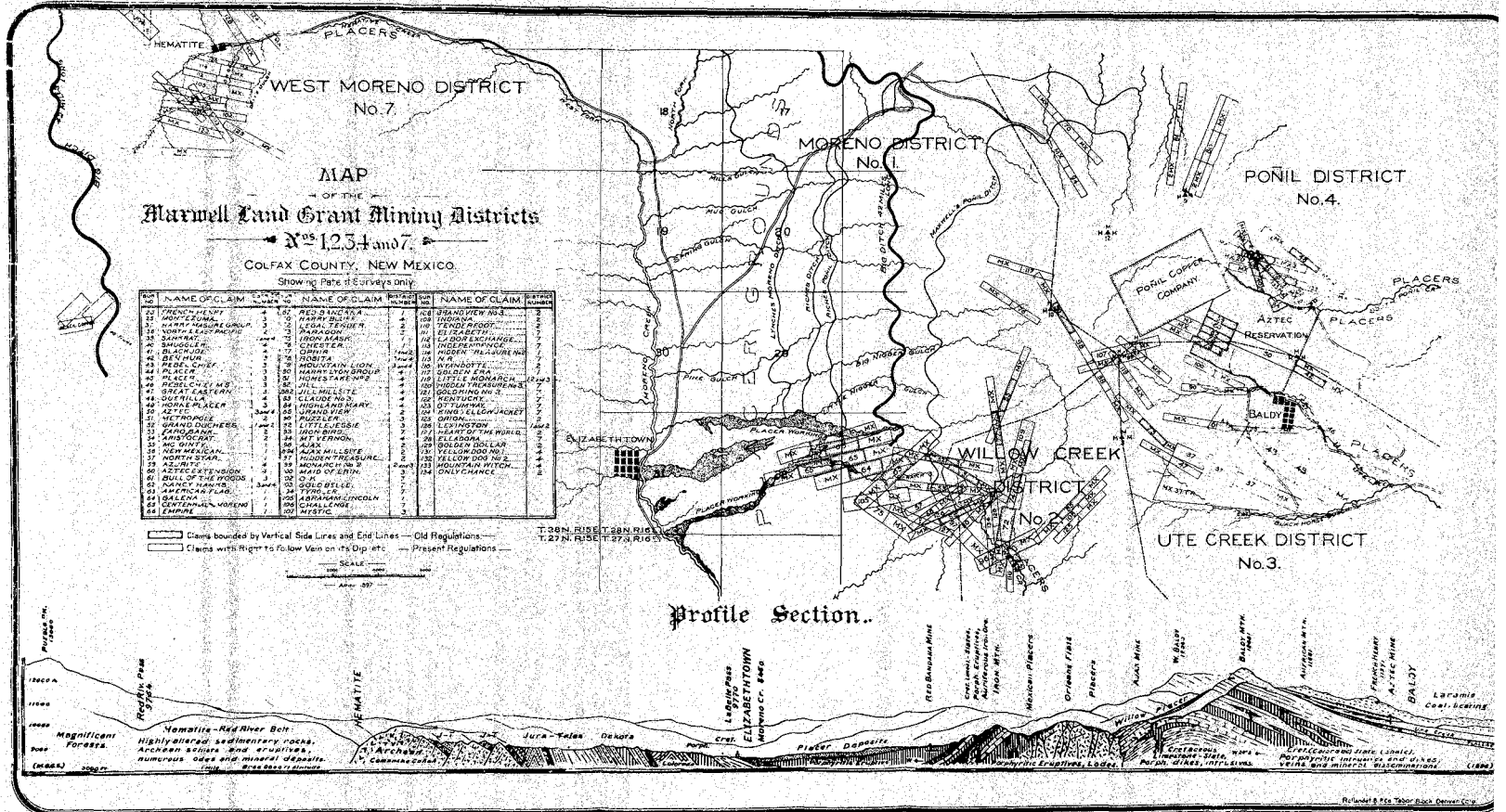
While activity around Cerrillos, at Old and New Placers (the oldest gold-producing areas in New Mexico) was minimal during most of the 1870's, the area was never completely forgotten; the legends of its wealth continuously spurred prospectors to rework the old claims with eternal optimism, knowing they would reap a rich harvest. Most did not. A few, however, did strike paydirt, and a discovery in 1879 led to a new rush into the old diggings. Gold was not the attraction, but rather, lead and silver. In January 1879, some Colorado miners formed Dimick's Camp, later called Turquoise City. According to one eyewitness, "it has about forty houses, some of them quite substantial, built of lumber." Other camps formed in the district, Purdens Camp, Poverty Hollow, Bonanza City, Carbonateville, and Cerrillos Station, all rough-hewn, small boomtowns. The lead and silver were not abundant enough to give long life to the area, or support large numbers of miners.

One strike in the Cerrillos area did involve gold. It came at the New Placers, where an earlier rush resulted in the establishment of the town of Tuerto. The new discovery, made in 1879, just south of the site of old Tuerto. When word got around, the customary rush to the new fields occurred, and by late 1879 a new town, Golden, had been founded. As before, during the long history of this region, the shortage of water limited the full potential of the district.

While some hope still persisted in the last year of the seventies that the Cerrillos district was about to boom again, the activity was stifled in some areas as soon as it started. The action of federal courts granting the owners of Spanish or Mexican Land Grants the surface and mineral rights to much of the Cerrillos area invalidated mining locations on the property. Resulting legal tangles, law suits, and local bitterness added to the crisis and dampened mining and prospecting. Only those areas free from the legal problems became centers in the new mining boom.

Activity continued in the Jicarilla Mountains of central New Mexico. These placers, first discovered in 1850, had only minor activity in the 1860's. During the mid-seventies, however, interest began to grow concerning the placers at White Oaks. A report in the *Mining and Scientific Press*, July 1877, told of the beginning of one of New Mexico's important gold camps in the 19th century:

> *A genuine excitement has begun over the Jicarilla placer mines in New Mexico. There is no water whatever on the ground, and all operations must be carried out by dry washing, as it is called. The top ground of these diggings yields from 10 to 25 cents to the pan. The deposits are very deep and have been known for some years, but the complete absence of water has prevented their exploration. Several parties of miners from southern Colorado have recently started for the new camp. A new process for working the gravel by means of a*



Maxwell Land Grant Company Papers, Special Collections, University of New Mex

MAXWELL LAND GRANT MINING DISTRICTS, 1897.

machine known as Finn's Patent Dry Washer has lately been tested on the ground and is reported to have given great satisfaction.

In addition to the placers worked at White Oaks, lode mining began in 1879. That year, the North Homestake mine was discovered at White Oaks, and in succeeding years, became the number one producer in the area. In the northern part of the Jicarilla Mountains, in what became known as the Jicarilla mining district, some minor activity continued into the 1870's, but production came only from the few individual miners who worked the area for day wages. In neither the White Oaks nor the Jicarilla districts did mining grow to boom proportions during the seventies. The boom came in the eighties, particularly to White Oaks.

Southern New Mexico was the most active mining region in the territory during the seventies—a distinction it retained throughout the rest of the 19th century and well into the 20th century. Not only did most of the older areas continue to produce, but more important significant new booms developed and new mining camps sprang to life.

At Santa Rita, little mining took place in the 1870's, but an important series of events led to extensive development in later years. When New Mexico was ceded to the United States by the Treaty of Guadalupe-Hidalgo in 1848, ownership of the Santa Rita property came into question. The Elguea family, holder of the Santa Rita del Cobre Grant, had not actively participated in the operation of the mines since early in the century. In fact, by the end of the Civil War, the claimant lived in Spain, handling the property through an agent in Mexico. A legal battle erupted in 1873 when Matthew D. Hayes attempted to acquire the property by direct application to the United States Land Office for a patent—an out-and-out effort to ignore the claim of the Elguea heirs. While many such claims were being made against Spanish and Mexican grants at this time by people trying to acquire New Mexico lands by fair means or foul (and succeeding), this claim by Hayes failed. The commissioner decided title to the property was vested in the Elguea heirs, and their rights were protected under the treaty with Mexico, whereby any rights previously acquired by Mexican citizens in the territory in 1848 were preserved. From this decision, an appeal was made to the Secretary of the Interior, who, on November 6, 1873, approved the stand taken by the

GHOST TOWN.

Commissioner of Land Patents, and ruled that the claim holders had no right to the ground (known to the Department of Interior for more than half a century as the property of the Elguea family and its heirs), and that no title could be obtained, except from them. Hayes and his associates located the heirs in Spain and arranged to purchase the property. In addition, they relocated the ground under United States law, and a patent was eventually issued.

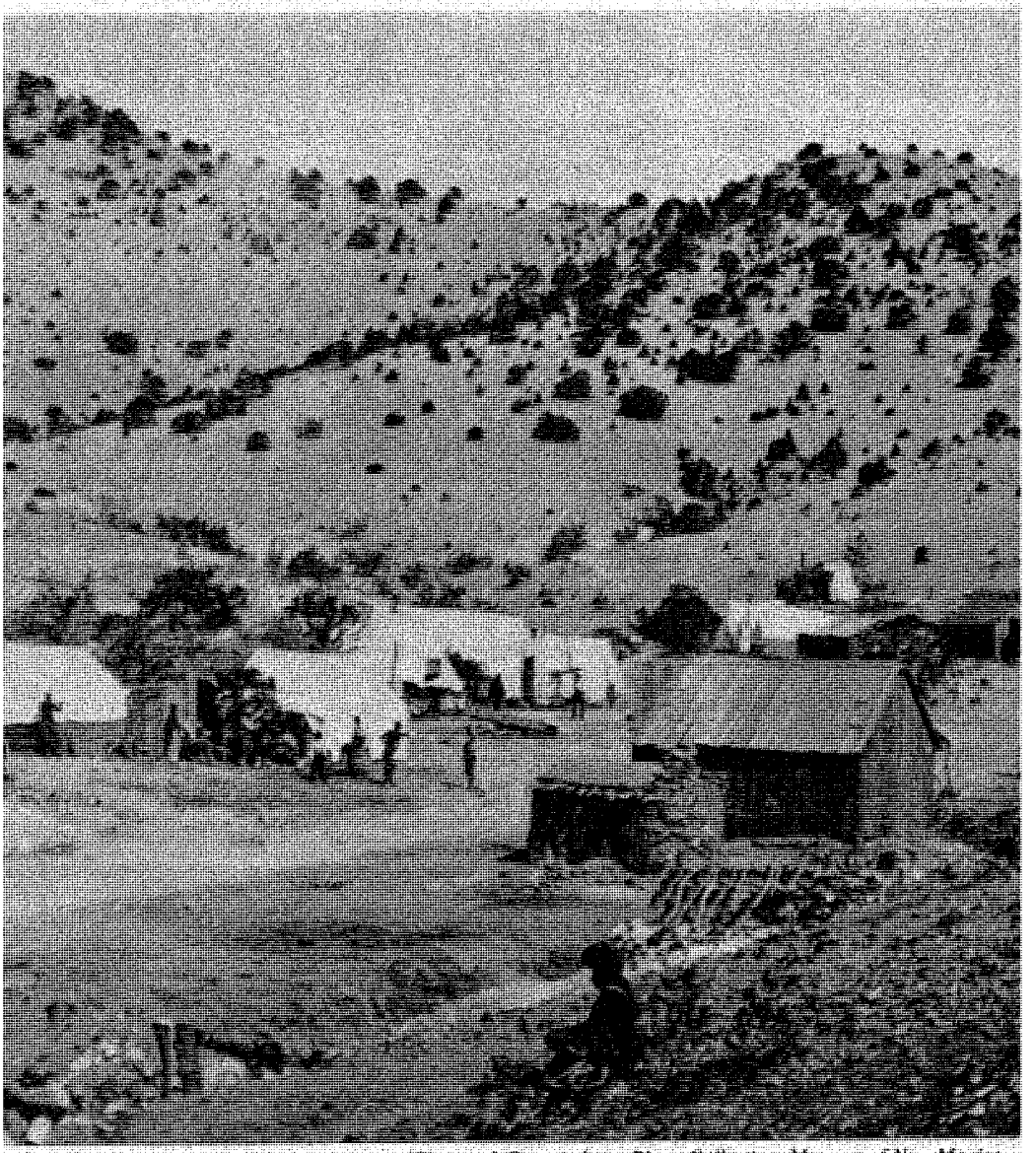
Hayes concentrated his mining efforts on the old workings, called the Romero workings, which were, according to tradition, the spot of the original discovery in 1798. Hayes had a shaft sunk through the old workings to a depth of 248 ft, and a small smelting furnace was built. It did not work well. Nevertheless, a shipment of 50 tons of high-grade ore and incompletely smelted copper was sent to the smelter at Baltimore, Maryland, and another to the Revere plant at Point Shirley, Massachusetts. The ore and concentrate had to be hauled 700 miles, over Raton Pass to Trinidad, Colorado, and there loaded onto the Santa Fe Railroad. Due to transportation costs and other difficulties, Hayes' operations proved unprofitable. His connection with the Santa Rita mines was important, however, because he cleared the title and consolidated all other principal claims under one owner. In 1880 he sold out to J. Parder Whitney of Boston. Santa Rita, with her claims consolidated, became the first area in the state to have large-scale mining capability. With minor exceptions, Hayes' property became the basis for the Chino Copper Company operations at Santa Rita.

The Hanover mine continued production, but with increasing difficulties. The copper ores, so rich in earlier days, were worked out, leaving lower grade ores that simply did not make the effort worthwhile. The iron and zinc deposits that made the mines at Hanover boom again at a later date, remained hidden. Nevertheless, the past greatness of this mine prompted the General Land Office Commissioner to report in 1871, "In the opinion of the writer, the Hanover Mine was the most significant and richest mineral deposit ever discovered in New Mexico." Except for brief periods of low productivity, the Hanover declined as an important mine in the 1870's.

Mining also continued at Pinos Altos, but like other areas, a decline from its early boom days was in evidence. The opening of other mines and mining camps in the vicinity of Pinos Altos drew many miners away, particularly the adventurous, with the result that many of the claims in Pinos Altos were not worked during the seventies. In addition, the Indian problem in southwestern New Mexico remained the most acute in the territory. Pinos Altos, because of its location in the mountains, was particularly vulnerable. Despite the problems, the hardy miners at Pinos Altos hung on through the seventies and the camp produced considerable wealth.

In the Burro Mountains, scene of early Indian and Spanish mining activity, a new strike was made in 1871: Robert and John Metcalf found the old turquoise mines and also discovered copper deposits, but the hostility of the Apaches in the vicinity prevented working the claims. In 1874, John E. Coleman, nicknamed "Turquoise John," entered the Burro Mountains and began to develop both the copper and turquoise locations. Active mining in the Burros in modern times dates from the work of Coleman. In 1879, the St. Louis mine was located by James Bullard, John Swisshelm, and J. W. Fleming. This property later became the central holding of the Burro Mountain Copper Company, and ultimately the basis for the Phelps-Dodge holdings in the Burro Mountains. During the 1870's, considerable high-grade turquoise and some copper were taken from these harsh desert mountains.

While some of the old mining districts prospered during the 1870's, and others



Bennett & Brown photo, Photo Collection, Museum of New Mexico

CERRILLOS MINING DISTRICT, CIRCA 1882.

lapsed into obscurity, the most important aspect of mining of the time was the development of a number of new mining areas. The intense prospecting in the preceding decade bore fruit, and the decline of Indian hostilities in some areas opened the way for increased mining activity. Three new roaring camps appeared in southwestern New Mexico: one growing out of important silver discoveries made at Georgetown (22 miles east of Silver City); the second at Ralston, just south of modern Lordsburg; the third at Chloride Flat, site of Silver City. All three became major producers of silver during the seventies.

At Georgetown, where high-quality silver ores were found in 1866, a mining

rush in 1873 became a full-fledged boom by 1875. The silver ores produced at Georgetown were reduced by the Mimbres Mining Company, located on the Mimbres River about 3 miles from Georgetown. The company operated two five-stamp crushing units in 1878. The population of Georgetown was estimated to be about 500 that same year. The main mines at Georgetown were the Naiad Queen, the McGregor, and the McNulty. By the end of the seventies this camp had produced an estimated $1,500,000 in silver.

In the Pyramid Mountains, just a few miles south of modern Lordsburg, the second boom area in southern New Mexico was generated by the discovery of silver. During the 1850's, the spot was called Mexican Springs. In 1858, a Butterfield overland mail station was established at the springs, and the name was changed to Grant. In early 1870, silver was discovered, and a San Francisco banker, William C. Ralston, became interested. The name was changed again, this time to Ralston. Two events occurred between 1870 and 1872 that gave the area a bad reputation, and again brought about a name change. In 1870, shortly after discovery, a group of San Francisco financiers and speculators formed the Hardpending Company to develop the mines. The principal owner was Asbury Hardpending, and very likely, William Ralston was also involved. The company began to circulate information regarding the richness of the Ralston claims controlled by the company. In one letter, they reported ores assaying $1,600 per ton, and that plans were in effect to run a narrow-gauge railroad to a 1000-stamp mill having a capacity of 2,000 tons of ore a day. In reality, none of the San Francisco owners had ever seen the claims, and the professed plans were no more than window dressing. In January 1871, the real reason for their wild claims became apparent. They were trying to interest a group of London bankers seeking investments in the United States into buying the claims at a reported price of $1,750,000. Hardpending was quoted in the San Francisco press that he would use the money, if the sale went through, to extend Montgomery Street in San Francisco. By late 1871, the whole scheme collapsed as reports showing the true value of the silver ores became better known.

Later in 1872, a hoax was perpetrated at Ralston that further harmed the new mining camp. Two miners, Philip Arnold and John Slack, spread the astounding news that they had found diamonds near Ralston. They produced specimens that later proved to have been salted. Again interest declined as investors shied away from the area.

But local mining men knew that valuable silver ores were locked in the earth around Ralston. One of these men, Col. John Boyle, founded the Shakespeare Mining Company in 1872, and the name of the camp was changed again—this time to Shakespeare. Serious mining began in the district, and Shakespeare became a typical boom town, complete with false front buildings, gambling halls, and saloons.

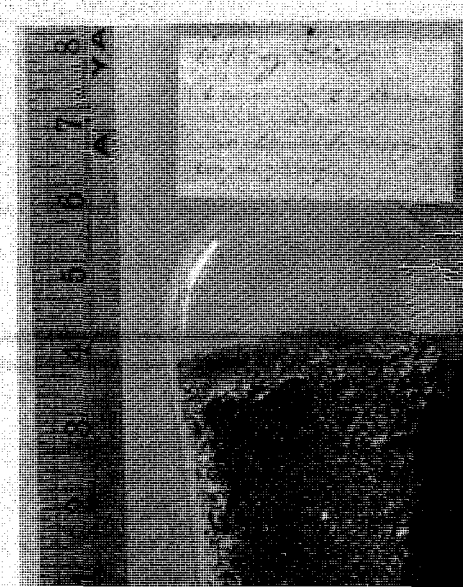
A little farther south of Shakespeare, a second mining district—the Virginia district—developed in the 1870's. The Superior claim, located in 1875 by Morris Lesinsky and Isaac A. Cohen, later became a part of the Eighty-five group, the most important mine complex in the district. The Virginia district was heard from year after year, well into the 20th century, as various mining companies worked the mines.

While mining captivated most men in New Mexico during those days, other men sought to develop the agricultural and pastoral potential of the territory. On January 17, 1869, William Milby of San Antonio, Texas, and John Bullard of Missouri, located a farm at a delightful spring in southwestern New Mexico

called La Cienega de la San Vicente. Neither man knew that a swirling silver camp—and finally Silver City, New Mexico—would emerge from their "farm."

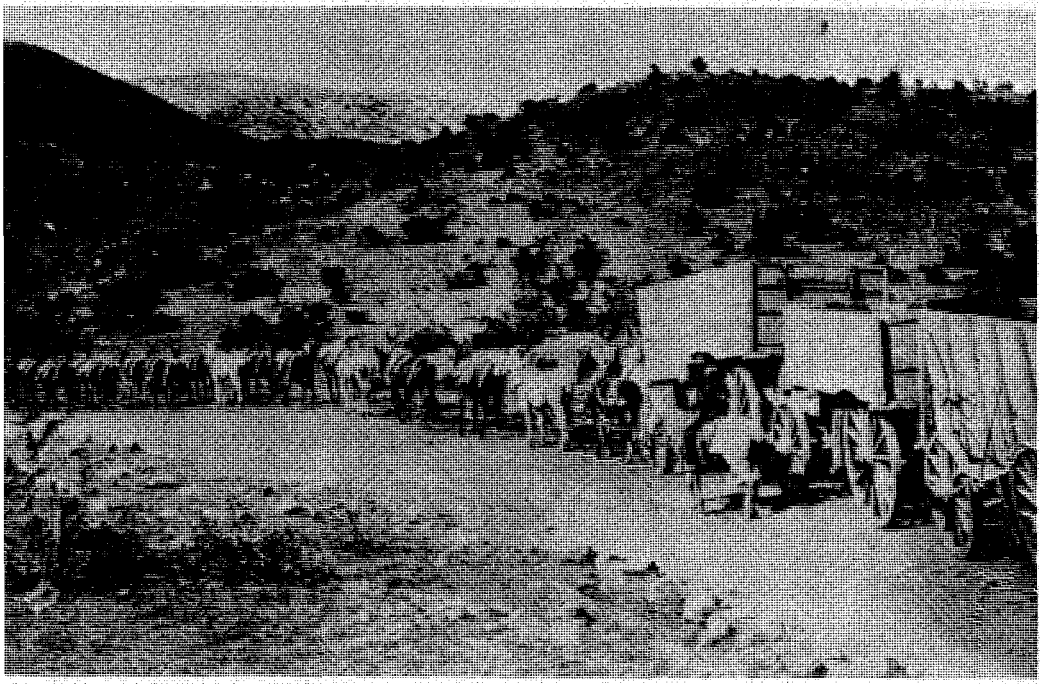
In the spring of 1870, Bullard led a prospecting party to Ralston (later called Shakespeare) where a silver strike had been reported. While in the Ralston area, Bullard was shown samples of silver ore and is reported to have said, "If that's silver ore, we know where there is plenty of it." On May 10, back at San Vicente Farms, Bullard went to the hills directly west of the farm and picked up some surface samples which resembled those from Ralston. They assayed about $60 to the ton—not fabulous, but promising. Other strikes were soon made, the Legal Tender probably being the first claim staked. As news of the strike became known, there was a rush to the area—two districts finally emerged. The first, the Silver Flat district, was never very productive; the second, the Chloride Flat district, became the first major silver-producing district in New Mexico, and during its 20 years of operation produced nearly $3,000,000 in silver.

Silver City, New Mexico, grew up as the main camp and center of commerce for the region, replacing Santa Rita and Pinos Altos. In 1872 it had a population of about 1,000 and in 1876, was granted a charter from the territorial legislature, emerging as the leading city of southwestern New Mexico. One eyewitness to the peak of the boom told of gold bricks (mostly from Pinos Altos, 6 miles to the north) and silver bars (from the Chloride Flat district) stacked like cordwood on the sidewalks outside shipping offices. Silver produced in the vicinity of Silver City was smelted locally in crude adobe furnaces. Some silver was concentrated by the "patio process" (see Mining Potpourri) and some by amalgamation in rotating barrels. During the first years, ores were crushed in arrastras, but gradually, stamp mills were brought in to do the job. At Bremen's Mill (treating ores from the Bremen mine, one of the most important producers in the district), the crushed ore was mixed with salt; then roasted to produce silver chloride. At other mills, the silver chloride was dissolved in brine and the metal was precipitated with metallic copper. Such primitive methods of extracting silver were relied upon until the railroad came to Silver City in 1883; only then did more modern methods and heavy equipment change the patterns of develop-



ONE DAY'S PRODUCTION OF SANTA FE DREDGING COMPANY AT GOLDEN, NEW MEXICO, CIRCA 1890.

T. Harmon Parkhurst photo.



Charles W. Marks photo, Photo Collection, Museum of New Mexi

ORE WAGONS AND 24-MULE TEAM AT WHITE OAKS, NEW MEXICO, CIRCA 1880.

ment. Despite these primitive methods, the Chloride Flat district was the major producer of wealth in New Mexico during the 1870's.

Fortunately, these strikes in southern New Mexico came just as Elizabethtown and Pinos Altos suffered a serious decline; they gave a wandering, hungry horde of miners the chance to earn a daily wage. Could we but check by name the rosters of the mining camps of the seventies, we would certainly find a considerable amount of duplication as the miners wandered from camp to camp as ores dwindled in one place and new strikes were made in others.

One other minor rush took place in southern New Mexico that should be mentioned. At Lone Mountain, an isolated group of three low hills about 6 miles southeast of Silver City, rich silver ores were discovered in 1871 by Frank Bisbee, for whom the great Arizona copper camp was named. Some mining began immediately, and a small mill was erected, but operations lasted only two or three years.

In central New Mexico, in the Magdalena mining district, 26 miles west of Socorro, mining got under way seriously in the early seventies. Important lead mines, with some silver as a by-product, had been prospected earlier. The first claim staked out was the Juanita, and 3 weeks later, the Graphic was discovered. By 1870 the lead ores were being mined, then smelted locally in adobe furnaces. The product of this primitive process was shipped over the Santa Fe Trail to Kansas City. Only when the railroad reached Socorro in 1881, and Magdalena in 1883, did more advanced methods of smelting come into use. Around the mines in the Magdalena Mountains, two towns sprang up: Kelly at the mine site proper, and a few miles north, the town of Magdalena. For 20 years, the mines in the district produced most of the lead in New Mexico and have to be rated a

bonanza. The value of the lead-silver ores in the Magdalena district amounted to nearly $9,000,000 by the end of the century. While only a small fraction of that amount was produced in the seventies, that was the period when the mines and roaring camps began near the Magdalene (the face on the mountain).

In northern New Mexico, two small mining districts were developed; one along the lower reaches of Rio Hondo, the other in the canyon of Red River. Both areas had been prospected earlier, and both became active gold mining areas in the 1870's. In the Red River canyon, placer gold was discovered, and during the decade, sporadic mining was attempted. Swarms of prospectors roamed the region and favorable claims were staked out: Gold was the primary mineral, but some values in silver, copper, and lead were also located. Although a mill was built on the site of the future town of Red River, it only lasted one year. None of the mines in the region produced large amounts of minerals, although there was constant activity in the gold placers during the seventies. Total production of the district remained low, the ores yielding only small amounts of gold per ton.

South of Red River, Rio Hondo flows out of the Sangre de Cristo Mountains into the Rio Grande valley. Like Red River, it was heavily searched by prospectors from Elizabethtown. Gold was discovered at different points along its course, which led to the founding of the early mining camp of Amizette, named after the wife of the owner of the first hotel in the deep-canyon mining camp. A stage ran daily from the Denver and Rio Grande Railway station at Tres Piedras to Amizette; and a store was opened by Gerson Gusdorf, who, with his brother, owned one of the better mines. The early excitement soon ended, however, as the gold placers were exhausted and the veins pinched out. Despite its short-lived glory, Amizette was an exciting boom camp in the late seventies.

West of the Rio Grande valley in Rio Arriba County, another interesting mining region continued to produce. In the Petaca district, where mining first began in the Spanish period, activity was again apparent in the seventies. Not gold or silver, which so excite men's imagination, not copper, but mica was the mineral sought. Excellent quality sheet mica in sheets large enough for use as windows was found, and a ready market was close at hand. The large books of mica from the Petaca district were split and sold for windows in Santa Fe and Española. Not until transportation facilities improved and glass products from the east were available at low cost, did this region decline as an important mining area. The amount of wealth was not spectacular, but small operations added considerable income for the citizens of the region.

Both old and new mines in the Territory of New Mexico during the early 1870's created an optimism about mining which reached fever intensity after 1880. The wealth produced by the operating mines was not great—probably just a trickle—but the dollar amount per year increased steadily during the decade. In addition, new metals had been added to the production figures, particularly silver, which became the dominant product of the mines between 1875 and 1880. The Wells Fargo report on bullion handled in 1877 stated:

Gold shipped by express	$ 81,860
Silver shipped by express	$273,840

While these figures do not reflect all gold and silver produced, they do show the relative dollar values between them. Other products such as copper, mica, some coal, and other lesser minerals, played only a minor role in the total mining picture in the 1870's.

The rediscovery of valuable lodes and placers in the Cerrillos area; continued success at Pinos Altos; the opening of mines in less productive areas in the north; and probably most important, the location of substantial silver deposits at

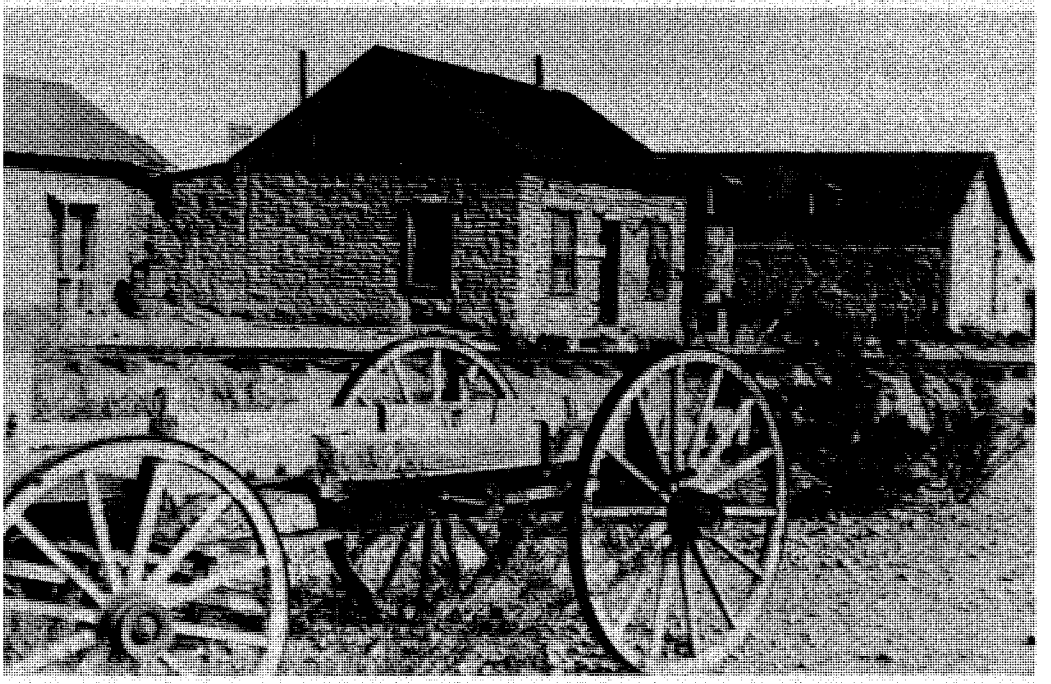
Chloride Flat, Shakespeare, and Georgetown, had a stimulating effect on prospecting. While gold was the beacon cry of earlier prospectors, silver became the big draw of the 1870's. Although gold was found in a number of places, the discoveries were relatively insignificant. Silver ores, on the other hand, were being located in vast quantities. Perhaps the whole territory of New Mexico was the legendary Sierra Azul! Prospectors fanned out in every direction, despite the residual danger of hostile Apaches, to find out if the legend were true.

While the entire area of New Mexico was subject to some prospecting, emphasis was on the central mountains and the southwestern part of the territory. Not all prospecting focused on new regions, for new products were being searched out; minerals not sought by earlier prospectors. Some of the most significant mineral discoveries of the 19th century were located during this flurry of the 1870's; discoveries which led to major mining efforts in succeeding decades.

In the central region of New Mexico, several minor areas were under the searching eye of the prospector, along with several which became boom camps in the 1880's. The Nogal district, which was prospected earlier and showed promise of gold, was reprospected in the 1870's with few lasting results. The high country around the Sacramento Mountains was a constant temptation for prospectors, but the country looked better than it actually was in terms of mineralization. Farther north, at White Oaks in the Jicarilla Mountains, prospectors continued to locate important placer gold deposits, and in 1879 the first lode deposits were found. The claim for the North Homestake mine was established that year. Within a year the boom had started at White Oaks. Somewhat to the west of the Nogal and White Oaks districts, along the east edge of the Jornada del Muerto, the Hansonburg district was prospected heavily, resulting in the discovery of copper and lead ores. This discovery, however, did not lead to any significant mining activities in the 19th century.

In central and western New Mexico, two areas became prominent during the last years of the 1870's; one in the Black Range, another in the Mogollon Mountains. The Black Range silver deposits were located in 1879 and the Chloride Mining district was quickly established, with three subdistricts: the Black Range, the Apache, and the Cuchillo Negro. The discovery of chloride silver ores in 1879 is attributed to Harry Pye, a freighter working for the United States Army. While moving military supplies, he picked up a piece of float, which he threw into his wagon. Later, having filled the freight contract, he had the sample assayed and found it to have a high silver content. Pye and some friends returned to the site and located the Pye lode, near the future site of the Chloride post office. Other claims were quickly taken up by prospectors and the new camp was named Chloride, for the silver chloride ore.

West of Chloride, in the high, rugged Mogollon Mountains of west-central New Mexico, a gold discovery in 1875 led to one of the high points in New Mexico's history as a gold producer. Discovery was made by Sergeant James C. Cooney of the 8th United States Cavalry, who had been sent from Fort Bayard near Silver City to successfully rescue part of the Wheeler Survey of the United States Geological Survey, which was under attack by a band of Apaches. While in the vicinity, Cooney found a prominent outcrop that showed promise of rich gold content. At the end of his enlistment in 1876, Cooney returned to locate the claims. By 1879 the first ores were shipped to Silver City for processing, but Indian attacks in 1879 and 1880 temporarily closed the area. Apaches, led by their famed chief Victorio, raided the region in 1880, and Cooney was killed helping to defend the settlement of Alma, on the San Francisco River, a few



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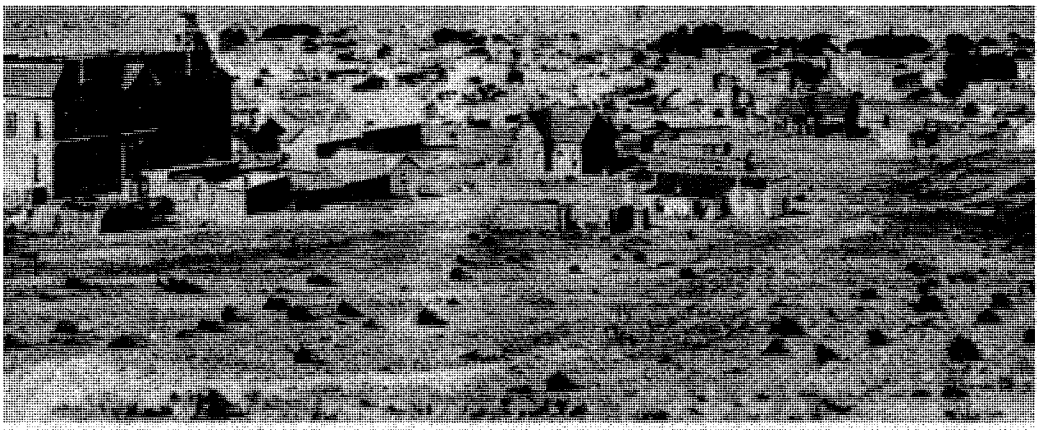
SCENE IN THE SHAKESPEARE CAMP, SOUTH OF LORDSBURG, NEW MEXICO.

miles from the mining district. Cooney's important discoveries led to development of Mogollon, one of New Mexico's most famous camps, which continued to produce bullion until the beginning of World War II.

In southwestern New Mexico, prospectors swarmed over every mountain and hill in search of silver. Spurred on by reports of successful mining at Chloride Flat and Georgetown, they combed every inch of accessible land, and many new prospects were uncovered. In the Organ Mountains, where mining activity was started at the Stevensen mine in the 1850's, many of the early claims were relocated. Although the values were mostly in lead and silver, there was some gold (there must be, remember Father LaRue's mine?). The Stevensen and the Modoc lodes continued to show the most promise, and emerged as producing mines after the railroad was extended down the Rio Grande in 1882. Across the Tularosa Valley, east of the Organ Mountains, were the Jarilla Mountains, prospected in 1879. No serious mining was done until early 1890, and again, the railroad made the difference. The Southern Pacific branch to Carrizozo passed by the eastern flank of the Jarilla Mountains, giving local mining a chance.

While no actual mining was accomplished during the 1870's, in 1875, prospectors working the Peloncillo Mountains in far southwestern New Mexico discovered the mineralized zones that came to be known as the Steins Pass and the San Simon mining districts: The values were in complex ores containing lead, zinc, copper, gold, and silver.

Along the eastern flanks of the Black Range, two strikes were made in 1877 and 1878 which led to the founding of two of New Mexico's illustrious mining camps. In 1877 placer gold was discovered in Sanke and Wicks gulches, and the placers were immediately worked by prospectors. It was not long before lode



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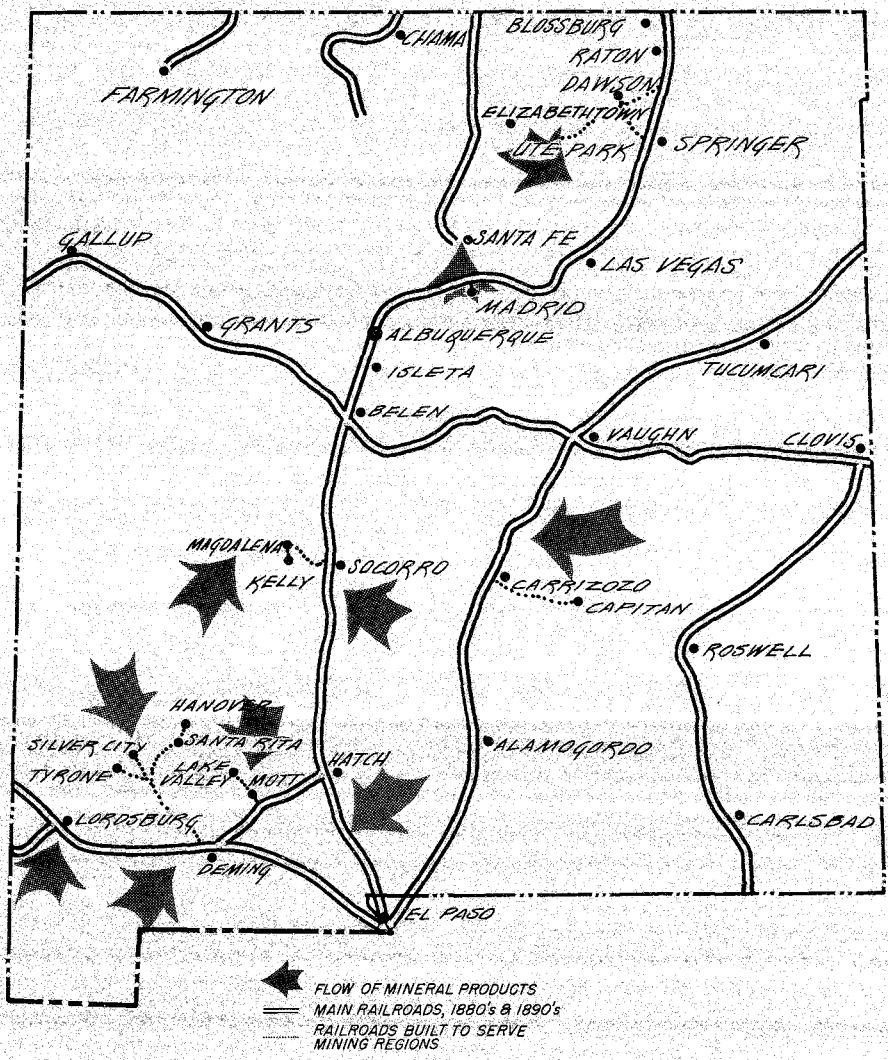
SILVER CITY, NEW MEXICO, CIRCA 1880.

mines were located which contained silver as well as gold. A rush to the area resulted in the establishment of a formal camp called Hillsborough, and later Hillsboro; the mining district was named Las Animas. The first ores mined at Hillsboro in 1877 were treated in arrastras, and by 1878, a 10-stamp mill was built on the site. By 1880, the camp became a center of full-fledged mining operations.

To the south of Hillsboro, a silver strike in 1878 kept prospectors on the move. The strike was made by George Lufkin, in rolling hill country just west of Monument Peak, and immediately the area filled with miners. The town and mining district of Lake Valley were born. Although some mining took place in the last 2 years of the decade, the larger silver-bearing deposits were not located until 1882.

One of the more unusual minerals found in New Mexico first came to light in the seventies. Meerschaum (the German word for seafoam), a tough, porous clay material light enough to float when dry, was discovered a few miles north of Silver City in 1875. Meerschaum can be carved and shaped, and was prized for making high-quality pipes for smoking tobacco. The deposit near Silver City is one of the few places in the Western Hemisphere where meerschaum has been found in commercial quantities. A substantial mining operation developed in the 1880's and 1890's from these white clay deposits.

The scene was set: gold and silver mines were a reality; prospectors had located what were described as fabulous ore bodies; speculators were touting New Mexico as the richest mining area in the United States; and foreign and domestic investors began to respond as gold and silver bullion began to flow out of New Mexico in the late 1870's, ushering in the most romantic, the most exciting, the most lawless, and certainly the wildest period in the history of mining in New Mexico.



19TH CENTURY RAILROADS AND FLOW OF MINERAL RESOURCES.

The Apex, 1880 to 1900

The last 20 years of the 19th century were good years for New Mexico. The most intense problems facing the frontier territory were either solved or well on their way to solution by the turn of the century. One writer referred to this period as the "renaissance" in the history of New Mexico. Before one can understand the romance and excitement of mining during those years, the ebb and flow of general historical forces must be laid out.

The population of the territory continued to grow—a necessary ingredient in the conquest of the frontier province. Although the official census of 1890 gave the population as 153,076, most local observers felt that there were gross errors in the federal count, and estimated the actual population at 185,000. Regardless, this represents a large increase from the 1880 figure. The ethnic makeup of the population also changed rapidly in the 1880's and 1890's. While immigrants in earlier decades had been from both the eastern part of the United States and from Mexico, after 1880 people arriving from the United States became the dominant feature of population growth. In many areas where the Spanish-Americans or Mexican-Americans were in the majority prior to 1880, the same groups became a minority by the turn of the century. This shift often led to serious conflict between old and new ethnic groups. Despite problems growing out of the increasing population, this growth gave New Mexico capabilities in terms of labor supply, capital, levels of business activity, transportation, and improved relations with the federal government, all of which allowed growth and improvements in other areas of endeavor.

This period was the railroad-building age in New Mexico. As the decade opened, the Santa Fe Railroad reached Albuquerque and quickly built south through Socorro, San Marcial, Hatch, and finally, on March 10, 1881, Deming —where the Santa Fe joined the Southern Pacific, building east from California. New Mexico was thus tied to the rest of the nation through the transcontinental rail system. Later in the decade, the Santa Fe built a line from Belen to the west coast, and the Southern Pacific continued east to El Paso and on to New Orleans, giving New Mexico two links in the transcontinental system. In the early eighties, the Denver and Rio Grande-Western Railroad entered New Mexico from Colorado with narrow-gauge tracks that reached to Chama and eventually Santa Fe. This final link provided rail service to most regions of New Mexico, and broke the age-old isolation which had hindered the territory's growth.

The railroad boom was married to the emerging mining boom, and branch lines quickly appeared, connecting the important mining camps into the system. In 1861, a short branch was built to the coal mines at Blossburg, in Colfax County, to supply coal for the Santa Fe locomotives. A similar line was built to the coal fields at Madrid, New Mexico, in the old Cerrillos gold district. From Socorro, the Santa Fe built west to Magdalena, then south to Kelly to tap the rich lead deposits, a total extension of 30 miles. The Southern Pacific built a branch to Silver City in 1884, and on to the rich silver deposits at Lake Valley a year later. This line, 47 miles long, originated in Deming. Later, a spur was built from this branch line to the copper deposits at Santa Rita, then on to the mines at Hanover and Fierro. Another spur was built to the Burro Mountain copper deposits. Over this branch from Deming—and its spurs—moved the heavy machinery destined for the stamp mills, concentrators and smelters of Mogollon, Pinos Altos, Georgetown, and later, Tyrone.

The El Paso and Northeast Railroad built from El Paso to Carrizozo at the turn of the century, and the Southern Pacific eventually extended this line to

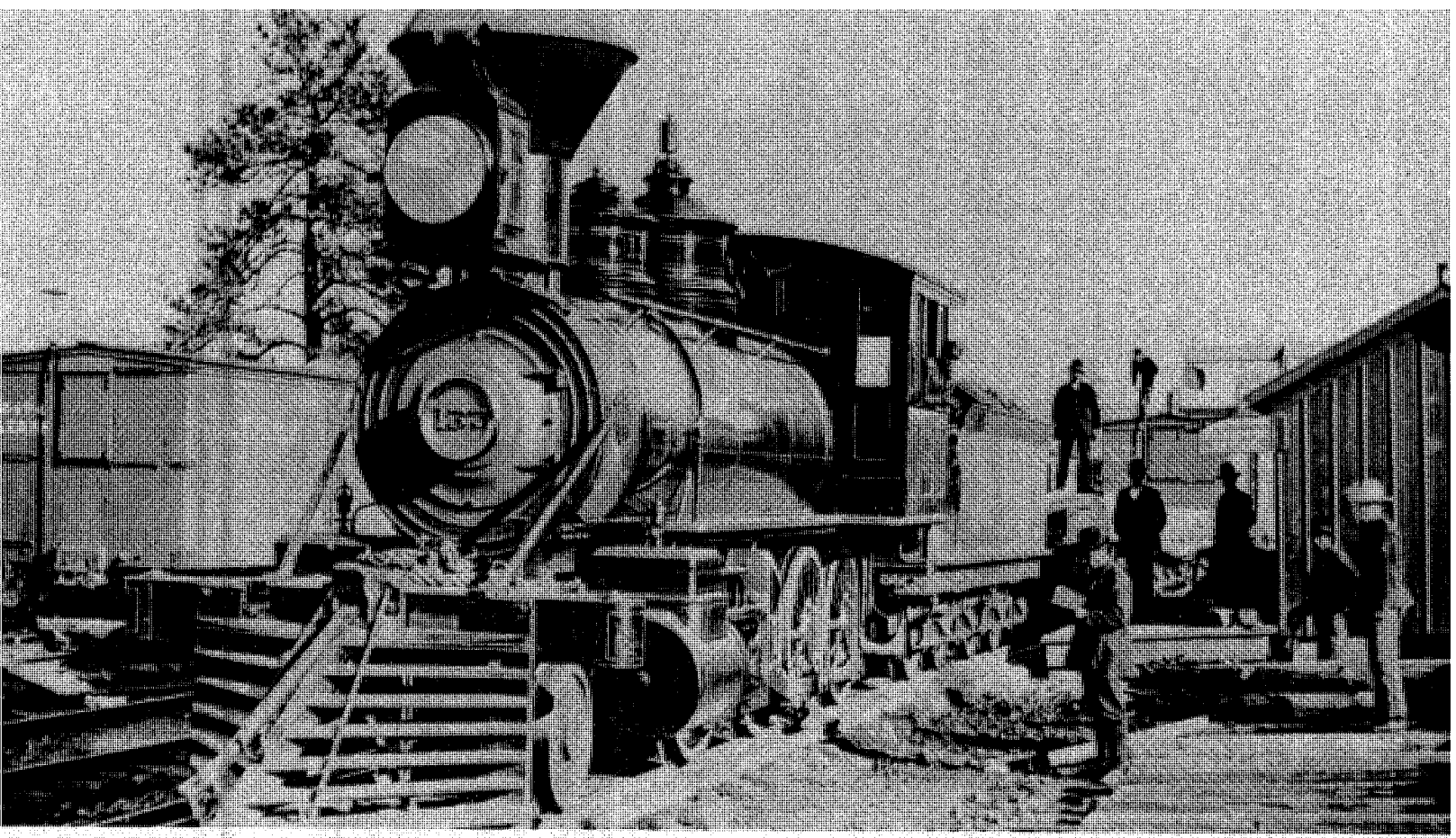
meet with Rock Island tracks for a connection to Chicago. The mining camps in the Jicarilla Mountains, particularly White Oaks, benefited from this line, as did the camps in the Sacramento Mountains. By 1900, the Pecos valley was also tapped by rail connections from Pecos, Texas, to Clovis, New Mexico.

The railroads brought immense growth to New Mexico in many areas. They brought people in substantial numbers; between 1880 and statehood in 1912, the population grew fourfold. Steel rails also brought the benefits of advancing technology: The availability of new advanced heavy machinery for the mining industry revolutionized both mining production and ore reduction in New Mexico. Agriculture also made substantial gains, benefiting from new machinery for production and for development of water resources. The railroads stimulated growth of the timber industry as well. Not only the boom period in mining, but prosperity in other aspects of New Mexico's economy during the 20 years after 1880 were directly related to the several thousand miles of steel track cutting across the plains, mountains, and deserts of the "Land of Enchantment."

To connect the various rail centers in New Mexico to the out-of-the-way places, a network of stage lines and freight companies was developed out of the earlier transportation system. Although long-haul stages and freight lines became obsolete with the coming of the railroads, there were many isolated communities; agricultural, pastoral, or mining, that required freight service; and the stagecoach and the freight wagon continued to be an important part of the historical scene until the internal combustion engine pushed them into obscurity.

With increasing economic activity, a growing transportation network, and a quickening of mining activity, it was essential that the Indian question be solved. Demands of businessmen, railroaders, and miners rose to a clamor, and the federal government responded with a concerted effort to solve the question of the hostile Indian in New Mexico that had threatened life and property for nearly 300 years. And it was solved. Thousands of United States troops, aided by several hundred Indian scouts armed with repeating rifles and pistols, penetrated the last strongholds of the Indians, and gradually broke down their resistance. Under the weight of steel and increasing numbers of white men, the Apaches were doomed. Though civilization would swallow them, they made a spectacular defense of their lands and their way of life against both Spaniards and Americans. They were masters of the desert and mountains, and only the gods of science and technology succeeded in overcoming them and their desert gods. The end came on September 3, 1886, when Geronimo and his small band surrendered to General Miles at Skeleton Canyon, in southern Arizona. With the end of the Indian menace, the mineralized districts in New Mexico were freely and safely open to prospector, miner, businessman, and freighter, and another obstacle to mining expansion was removed. A mining boom came of age.

The propaganda pouring out of New Mexico about her mineral wealth (which grew in intensity during the 15 years after the end of the Civil War), also bore fruit. Whether the stories and reports were true, whether they were exaggerations, fabrications, or objective views, made little difference in light of the madness that gripped an optimistic nation whenever mining was discussed. Eastern and foreign capitalists took the bait and began to pour in millions of dollars on the flimsiest of evidence; dollars that were used to purchase needed mining machinery and equipment—a new condition for New Mexico. Mills and smelters were built; concentrators and stamp mills; and even towns grew out of this influx of capital. Much of this money was wasted, perhaps most of it, but this capital laid out of the boom, and New Mexico benefited in business, agriculture, government, and transportation.



Ben Wittick photo, Photo Collection, Museum of New Mexico

THE LOCOMOTIVE "BABY" ON GLORIETA SUMMIT, OCTOBER 1880—THE BEGINNING OF THE RAILROAD AGE IN NEW MEXICO.

Exploitation of lands for agriculture, stock raising or mining was impeded by cloudy titles to the Spanish and Mexican land grants. Legitimate grants from the Spanish or Mexican governments, and other private property held in New Mexico prior to American occupation, was guaranteed by the treaty of Guadalupe-Hidalgo. Little was done prior to 1880 to bring any semblance of order out of the chaos surrounding land claims. Some congressional action was taken on grants recommended for approval by the Surveyor General of the United States, but under this system, politics rather than law was the guiding principle. Some monumental frauds were perpetrated, such as the Maxwell Land Grant in Colfax County. As one observer said:

> *No claimant could secure such legislative confirmation of his title unless he had money enough to go to Washington, organize a lobby, fight or buy off bloodsuckers and wield sufficient influence to get a bill through congress for such a purpose.*

By 1891, a new method was established when the Court of Private Land Claims was set up which eventually adjudicated most of the disputed grants—a process taking nearly 15 years. Through most of the mining boom period, the land question continued to hamper mining in disputed areas. In some local areas mining stopped entirely. Fortunately, most of the important mining regions were outside of conflict and not subject to much litigation.

Statehood for New Mexico, much sought after during these years, was not achieved—a bitter pill for the people of the territory. While this fact did not have a particularly depressing effect on mining, it meant that many local problems were complicated by being brought into national politics. New Mexico did not have the benefits of local automony which went with statehood.

Mining in New Mexico and the entire Far West was dramatically affected by the national political arguments over silver and its role in the national monetary system. Those advocating "hard," or stable, money sought a strong gold standard and advocated the weakening of silver, which resulted in the decline of silver prices. Those wanting "soft," or inflationary monetary policy, advocated free coinage of silver at a fixed ratio of 16 to 1 of gold. Between 1876 and 1890, federal policy was such that limited coinage of silver kept silver prices fairly high; at least high enough to make silver mining in the West profitable. In 1890 the Sherman Silver Purchase Act increased the national demand and forced silver prices upward. The hard money advocates in the federal Congress won the day in 1893, however, when they achieved repeal of the Sherman Act of 1890. Their action, prompted by a financial crisis across the country, was done in the hopes of stabilizing currency. The impact on mining in general and silver mining in particular was disastrous throughout the American West. In most areas, large-scale silver mining came to an end.

The situation presented during the waning years of the 19th century was now right for the spectacular growth of mining. Mines opened earlier now had better transportation, capital, and management, and many of them showed expanding capabilities. New mines had opened during the seventies, revealing some truly fine ore bodies. Prospecting had done the rest, locating numerous important deposits. These factors, plus the brightening prospects in other productive enterprises, set the scene for the "big boom" in New Mexico's early mining history.

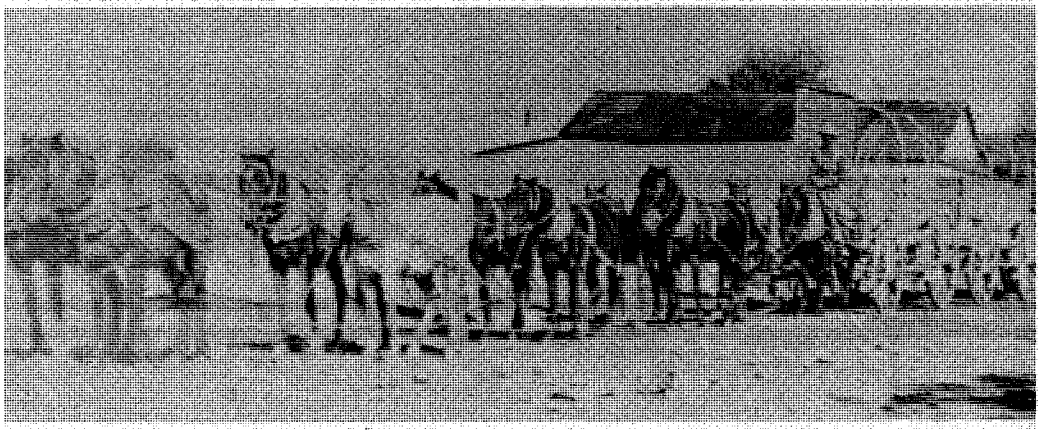
And boom it did, but not in the old established and historic areas of New Mexico. Earlier periods saw the emphasis on mining in northern New Mexico at such places as Cerrillos (New and Old Placers) and Elizabethtown. The boom of the 1880's took place primarily in the central and southwestern part of the

territory. While several areas in the northern part of New Mexico emerged as important mining centers, the north generally declined in importance.

In the oldest mining district in New Mexico, around Cerrillos, new strikes of gold, and more important, of silver-lead ores (carbonates) in 1879, led to a new boom that lasted through the 1880's. These strikes resulted in the founding of the towns of Carbonateville, Bonanza City, Turquoise City, Golden, and Cerrillos; all of which are ghost towns today, except Cerrillos and Golden. These towns lay in a line from a spot south of Santa Fe, along the western flank of the Ortiz Mountains. The development of the region was difficult, because the ores had to be smelted before the values could be recovered. The rush into the area was not so much for the wealth that each individual miner could gouge from the earth, but for wages available from small mining companies. In 1880, the *Mining and Engineering Journal* reported that about 100 lodes were being worked in the Cerrillos area by some 300 miners. Wages were $25 to $35 per month, plus board.

Also in 1880, the Associated Press reported the old Ortiz grant had been confirmed by receipt of a patent, and had been sold to Senator J. B. Chaffee and S. B. Elkins. It contained 69,000 acres on the main line of the Santa Fe Railroad, which was then nearing completion. The purchasers were reported to have plans to develop the mining potential of the grant, which included a 40-mile canal from the Pecos River to the east to supply water for the placers. Little came of these plans.

One of the best mines in the Cerrillos area at the time was the Cash Entry, owned and operated by an English mining company. During one period in the 1880's the Cash Entry reported a payroll amounting to $150,000 per month. While this was undoubtedly a gross exaggeration, the mine did produce a large amount of lead and silver ore, and was the major employer of the region. During the period of English operation, the ores from the Cash Entry were concentrated locally, then hauled by wagon to Las Vegas, New Mexico, where they were shipped by rail to the east coast, then on to Wales for smelting. Silver was the only product recovered in the smelting process: the lead and zinc were discarded onto the slag dumps. The English company sold out when values dropped at the mine in the late 1880's, and the Cash Entry declined as a valuable mine, although it was worked intermittently for many years.



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FREIGHT WAGONS USED TO HAUL EQUIPMENT AND SUPPLIES FROM SILVER CITY TO MOGOLLON, NEW MEXICO, CIRCA 1890.

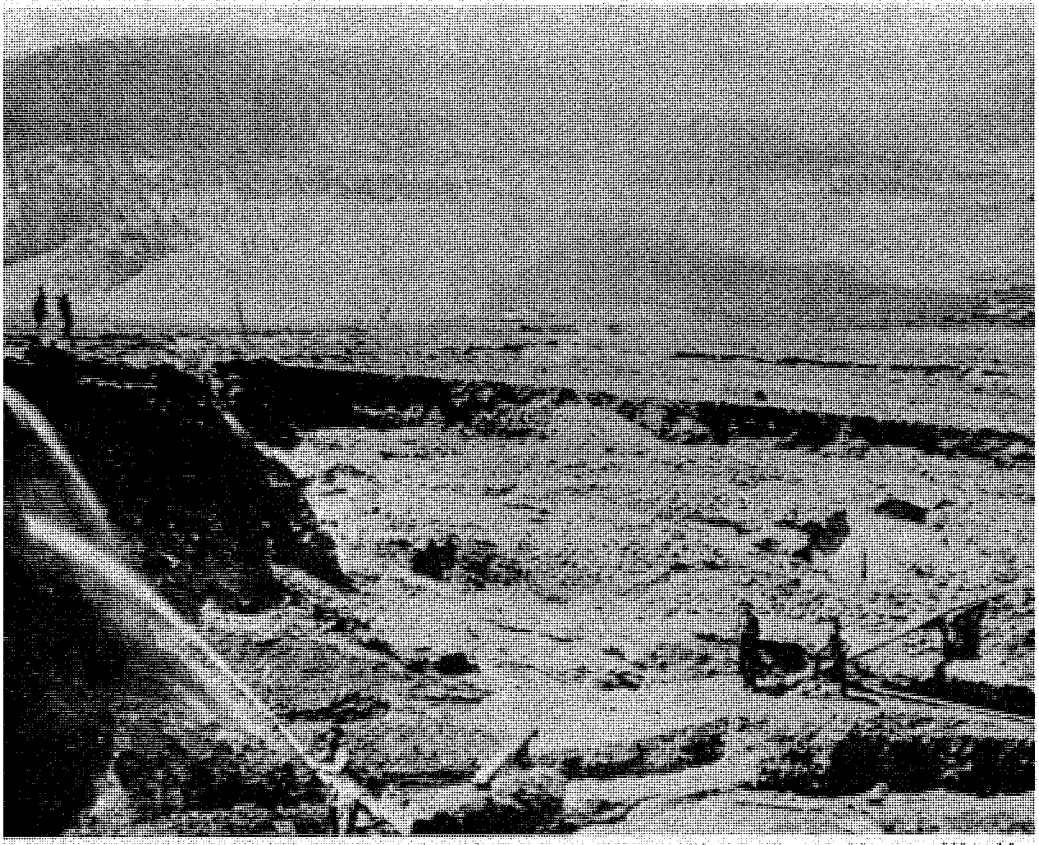
Lack of water, the largest drawback to mining since the first gold discoveries in the early part of the century, continued to be a problem. Even the increasing technology that came with the railroads failed to solve the water shortage. Several schemes were planned, and several were tried. A plan to bring water from the Pecos River in a canal similar to the ditch that brought water from the Red River to Elizabethtown was never attempted. Although an artesian aquifer 500 to 800 ft deep was located near Golden, and several wells sunk there produced about 25 gallons per minute, the quantity of water obtained from these drilling operations was inadequate for large-scale mining operations. A pipeline 13 miles long was constructed from the Tuerto (San Pedro) Mountains east of Golden to the placers at Golden at a cost of $500,000. Built by the San Pedro and Cañon del Agua Company in late 1879, and sold in 1885 to the Golden City Placer Company for $300,000, it was a relatively unprofitable venture.

The turquoise mines, celebrated in the district from the earliest discovery and exploitation by the Indians of New Mexico, experienced a revival during this period. The major mines in the region were controlled by the famous Tiffany Company of New York through the American Turquoise Company. Production was meager, and local views were that low output was intentional to control the price; that there was plenty of turquoise in the mines. After about 1895 there was little activity, and most of the turquoise mines were closed.

By-and-large, the Cerrillos district prospered during the 1880's, but decline set in quickly after 1890. Bonanza City and Carbonateville were abandoned and became ghost towns. Cerrillos, reported to have as many as 2,500 people at the peak of the boom, settled back to a sleepy village. Golden, the gold camp where the New Placer or Tuerto district had boomed 35 years earlier, became nearly deserted. Turquoise City lasted only briefly. Yet it was the most exciting and productive decade in the long history of the oldest mining district in New Mexico.

Elizabethtown, so vibrant, so full of life in earlier years, continued to fade into obscurity. Fewer and fewer mines were in operation, and fewer people remained in the decaying town. There were intermittent efforts to locate new pockets of placer gold or new lodes, but only a small degree of success was in evidence. One new discovery that brought a ripple of excitement for a short time was in the West Moreno district, 5 miles northwest of Elizabethtown. The discovery of placers in 1896 and the growth of the small town of Hematite gave hope that all was not lost. At the same time, gold placers were found 10 miles southwest of Cimarron in the Urraca and Bonito districts. While these were a considerable distance from E'town, they added to the momentary excitement. None of the discoveries proved to be of great importance, however, and by the turn of the century even the prospectors were giving up hope in the region of E'town.

From time to time, efforts were made to apply new techniques to extract gold from old mines or placers, but again, success was rare. The Aztec mine, so famous and productive under the ownership of Lucien Maxwell, continued to intrigue investors. There was hope that somewhere in old Baldy Mountain there were more rich pockets of ore that would rival those found in the first wild years. The mine remained under the ownership of the Maxwell Land Grant Company (Dutch ownership at the time), but was leased to a group of New Mexico businessmen, including Tom Lynch, who had been in on the early development at E'town, a man named Shelby, and Thomas Catron, later a United States Senator from New Mexico. These men in turn convinced a group of English investors to work the mine, and leased it to them for $100,000; only half of which was ever paid. The venture was a complete failure. The three New Mexicans may



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HYDRAULIC PLACER MINING, MORENO VALLEY NEAR ELIZABETHTOWN, NEW MEXICO, LATE 19TH CENTURY.

have made a profit from the Aztec, but not from mining. They made it on speculation and promotion.

E'town, so full of life and hope from 1868 to 1880, was on its final journey to obscurity. Last-ditch efforts to bring mining in the region back to life after 1900 failed. The miners, at least those who were ambitious and capable, moved on to greener pastures farther south. While some lamented the dying of Elizabethtown, they soon forgot her in the excitement and wildness of new, rich mining camps.

A few of the miners deserting E'town did not have to go far to seek new jobs. On the Rio Hondo, on the other side of the Sangre de Cristo Range, strikes in the late seventies led to a relatively small mining operation that lasted into the 20th century. Gold was found up the canyon, and the small mining camp of Amizette sprang into existence. By 1895 Amizette was worked out, but new strikes were located farther up the canyon by William Frazer, who founded the Frazer Copper Company to exploit the copper-gold ores. Some of his financial backing came from Albert C. Twining, a New Jersey banker, and as the new camp grew into a small town, it was named Twining. A considerable fortune was spent trying to develop the mines of the new district, with little success. Neither Amizette nor Twining can be considered, by any stretch of the imagination, as very productive

camps, but they did generate considerable local excitement, and in terms of the 1890's, helped keep alive the myth of great wealth.

In the Red River district, prospecting continued through the eighties, and in the nineties a rush occurred with the discovery of a variety of minerals, including gold, silver, copper, and lead. It was never a rich area, and the mining was done mostly by small-scale operators working the rugged gulches and canyons feeding into the Red River. The town of Red River was laid out in 1894, around a small milling and smelter operation. Eastern investors showed interest in the district, and the Waltham Watch Company tried to develop one of the copper deposits. Other investors were tempted by the myths and exaggerations pouring out of the region.

Perhaps the brightest spot in northern New Mexico was the brief mining boom in the Jemez Mountains 30 miles west of Santa Fe. Gold and silver discoveries in 1889 led to the establishment of the Cochiti mining district and the town of Bland. A boom developed that reached its peak in 1893 and declined quickly as the century closed. Production figures are uncertain, but values in gold and silver exceeding $1,000,000 were extracted from the Bland area during the 1890's. The problems for the miners at Bland were as difficult as any in the territory. The camp lay high up in rugged mountains, and all freight, equipment, and goods for the miners and the town had to be hauled up one of the most treacherous roads imaginable. Ores were brought down the same trail, and only the most expert and courageous ore-wagon drivers dared the hellish canyon. At one point, the road was cut from solid rock so steep that the wagons had to be set on sleds to prevent them from running wild down the mountain.

As was typical in most of New Mexico's mining districts, capital from eastern sources played a role in the development of the more important mining enterprises around Bland. The Lone Star mine and the Bland mill were both owned, for a time, by a Mr. McFarland. McFarland, a builder of express wagons and similar vehicles in Chicago, furnished Wells Fargo with most of their wagons. Another major producer at Bland, the Albermarle, owned by Boston investors, boasted a 500-ton dry crushing mill and cyanide plant. A rivalry developed between Albermarle owners and McFarland for control of Bland mining. In the end, McFarland was forced to sell out his interests, and the Navaho Gold Mining Company was formed to operate the combined mines and milling operations.

Despite the intense excitement of a new town, the power struggle among eastern capitalists, and considerable gold production for a few years, Bland had only a brief history as a productive mining camp. It had several revivals in the 20th century, but they resulted in minimal production.

In Rio Arriba County, some minor exploitation of mineral resources continued. In the Petaca district, which had been producing sheet mica for local markets since Spanish days, small-scale mining operations were in evidence throughout the eighties and nineties. In 1885 it was reported that the miners at Cribbenville, Petaca district, had excavated an area of 13,160 cubic ft, producing mica plates ranging from 2 by 2 inches up to 10 by 12 inches. In 1886 production figures showed 2,000 pounds of fair-quality mica shipped. While figures are not readily available year by year, the mines in this area produced steadily, continuing to provide people in the vicinity with a small but steady income in addition to their agricultural and pastoral activities.

The Hopewell district in Rio Arriba County, which later became the Headstone and Bromide districts, generated some excitement when in 1881, silver and placer gold were discovered. This started an influx of miners, and there was a small but steady mining activity in the area until after the turn of the century.

Several hundred thousand dollars worth of gold and silver came from the placers and small mines that developed. Most of the ores were low grade and unprofitable for large-scale mining, but enough rich pockets were found to keep interest alive.

One final mineral product has to be credited to Rio Arriba County: Water. During the 1880's, Joseph's Hot Springs at Ojo Caliente was marketing its mineral waters; the only incidence of such activity in the territory during the eighties. Several thousand gallons of water per year were sold; the popularity of mineral waters increased in the 1890's, and several other areas in New Mexico entered the market. During the 2-year period from 1892 to 1893, 46,000 gallons of mineral water was marketed from New Mexico, most of it from Rio Arriba County.

Prospecting in northern New Mexico continued in the eighties and nineties, but with reduced results and enthusiasm. In the vicinity of Abiquiu, New Mexico, on the Chama River, some low-grade copper deposits were located that led to some discussion of exploitation, but only native copper was ever taken from the area. Although documentation is lacking, there is probably some justification for the claim. A mining engineer's report on the region told of an arm of "pure green, gray, or blue copper" measuring 40 ft in length, and weighing 1,425 pounds. Only isolated and infrequent finds like this were reported, however, and the region was never a significant mining area. The area in western Rio Arriba County was also prospected, and copper deposits were located in the Nacimiento Mountains. The ores, however, were low grade and the technology was not yet available to utilize them. The Nacimiento Mountains did not become an important mining region until the late 1960's.

In 1882 a significant deposit was prospected north of modern Pecos. Early production consisted of high-grade copper ores. The prospect was known as the Hamilton or Cowles mine in the 19th century, although little development occurred then. In the 20th century it became important, for after 1926, it emerged again as the Pecos mine, and during its life was one of the important mines in New Mexico.

Some prospecting was done in other areas—the Sandia Mountains east of Albuquerque, and the Manzano Mountains farther south—but little of value was found. The spectacular finds reported daily from southern and central New Mexico made anything found in the north pale by comparison. Both miners and prospectors shifted the scene of their efforts southward.

Four mining regions that developed across the center of the territory added great tonnage to the total mineral product of New Mexico; as well as considerable lore, legend, and some new roaring camps. These included the area around White Oaks, in the Jicarilla Mountains of Lincoln County; the mining area in the Magdalena Mountains, centered at Kelly; the silver-laden northeastern flanks of the Black Range at Chloride, and the well-known gold camp at Mogollon, in the Mogollon Mountains in the western part of the territory.

White Oaks, named for the trees surrounding the springs at the townsite, and famed as the setting for Emerson Hough's 1903 novel *Hearts Desire,* was the center of mining in Lincoln County. The boom was preceded by several decades of prospecting, and some placer mining. Laid out in 1880 following the discovery of important lode and placer gold ores, the town soon had a bustling population. In February, 1880, the *Engineering and Mining Journal* reported:

> *Gold is found in the gulches, and the miners are taking out about $300 per day, rocking. Fifty cents are paid per barrel for water, which is hauled about three miles to camp, from White Oaks Springs. There is no doubt, however,*

Photo Collection, Museum of New Mexico

BLAND, NEW MEXICO, CIRCA 1890.

but that water will be found near the surface on the location of the town site, about one mile from camp, when the owners of the buildings now being put up, sink wells.

White Oaks, like most other mining areas in New Mexico, had the constant and irritating (to the miners) problem of water shortages. But sufficient water was developed; considerable gold was recovered from placer operations and lodes in the North and South Homestake mines, and White Oaks became an influential town in the territory. So great was the optimism concerning White Oaks, it was decided in 1883 that a railroad should be built connecting the town to El Paso. By April 1883, the road, built by the El Paso and Northeastern Railroad, was completed 20 miles north from El Paso. The steel rails never reached White Oaks, however, and in 1899, Carrizozo became the division point. The rails were later continued north to connect with the Rock Island. Again, White Oaks was bypassed. Partly as a result of the railroad's decision to miss White Oaks, and partly because of dwindling production, White Oaks declined rapidly as the 20th century unfolded.

North of White Oaks, in the Jicarilla Mountains, there was some continued placer mining in the Jicarilla district. Mostly it stemmed from the number of people at White Oaks and their enthusiasm. Production was never large, nor particularly important.

In the Nogal district, also in Lincoln County, mining and prospecting increased when the area around Nogal Peak, at the northern end of the Sierra Blanca, was withdrawn from the Mescalero Indian Reservation. The most substantial mining effort came after the discovery of low-grade gold ores in 1884 by R. C. Parsons. He founded the Parsons mine, which shipped about 75,000 tons of ore over its

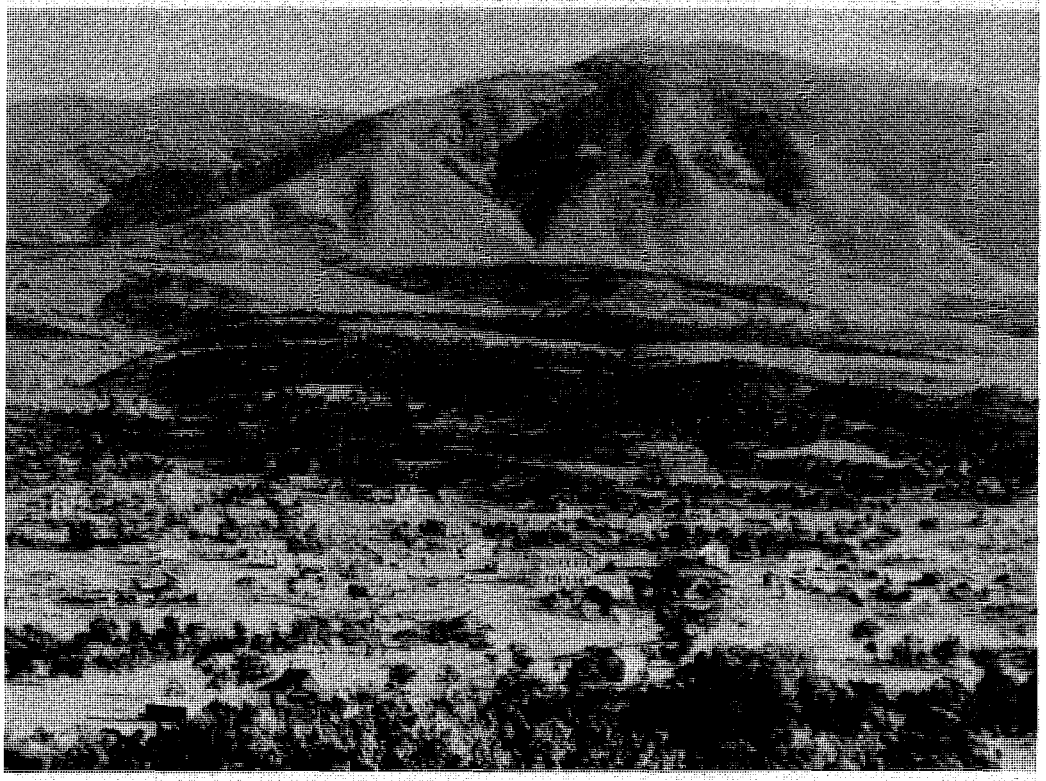


Photo Collection, Museum of New Mexi

WHITE OAKS, NEW MEXICO, CIRCA 1890.

life, producing a small profit for the operator. Total production of the area during the 19th century amounted to less than $200,000.

In the 19th century, Socorro County, which included what later became Catron County, boasted a number of important mining centers, and for a brief time in the 1880's it seemed the county and town of Socorro would emerge as the centers of mining in New Mexico. It did not, but the people of Socorro in the hectic 1880's did not know that. To them, the ores being ripped from the mountains of the county were the beginning of an endless stream of wealth insuring the city of Socorro as a rich and populous center of mining in New Mexico.

The town of Socorro, supply center for many of the mining camps of central New Mexico, had its own mining district, the Socorro Peak district. Discovery of silver on Socorro Mountain in the late seventies led to active mining as the eighties progressed. In October, 1881, some preliminary work was done, according to one report: "200 feet of exploratory shaft was done but no stoping. About 3000 tons of ore in sight." Much of this early work was done by William Courtis. Although a 10-stamp mill was built to handle ores, the production from these mines was disappointing, and the district only produced about $750,000 over its lifetime. While the mines did not produce the large amounts of wealth hoped for, the wages generated during the middle years of the 1880's helped to support the most significant boom in the history of Socorro. The principal mines were the Torrance and the Merritt, the latter is still utilized for scientific research purposes by New Mexico Institute of Mining and Technology.

In the Magdalena Mountains, 26 miles west of Socorro, where lead had been discovered earlier, one of the greatest bonanzas in New Mexico mining history began after 1880: The towns of Magdalena and Kelly prospered. While discovery at Kelly dated back into the 1860's, active large-scale mining began in 1881. In that year, the Kelly mine, which became one of the most famous in the district, was acquired by Gustav Billing, who developed the lead deposit to its fullest potential. The mine remained in the Billing family until 1904 when it was sold to the Tri-Bullion Mining and Smelting Company by Mrs. Billing. The Juanita, also near Kelly, was owned by E. W. Eaton in 1882. Eaton, involved in ranching in Socorro County, founded the Socorro Vigilance Committee in 1881. In 1882, he reported about the Juanita:

> *"One million pounds of this (lead) bullion is on the ground, it assayed 5 ounces of silver to the ton of ore in addition to the lead. Piñon charcoal was used in the smelting. As soon as the connection with the AT&SF is complete, cheap coke at Socorro will become an important factor in the metallurgical operation."*

Gustav Billing built a smelter at Socorro to handle the lead carbonate ores from Kelly as well as custom smelting for other mining areas in New Mexico. During the first years of operation, ores were hauled from Kelly to Socorro in huge ore wagons pulled by oxen. Transporting ore down Blue Canyon was difficult, treacherous, and time-consuming. In 1883, the Santa Fe Railroad agreed to build a spur to Magdalena and Kelly if the mines at Kelly guaranteed a certain tonnage per year. The immense amount of ore being recovered made such a guarantee easy to meet, and the road was completed that same year. With the railroad to the mines and the smelter at Socorro, the expansion around Magdalena and Socorro was staggering. Socorro grew rapidly to a town of nearly 5,000 during the middle eighties. Magdalena grew to nearly 1,300, and Kelly fluctuated between 500 and 800, depending upon the intensity of mining activity. The Magdalena district was one of the most productive in the territory prior to 1900. While its product was primarily lead (certainly less romantic than gold or silver), nonetheless the values were great and the volume high. The district yielded an estimated $7,000,000 to $9,000,000 from 1880 to 1902; most of which was produced before 1890. The Kelly and the Graphic mines were the major producers, accounting for nearly 90 percent of the total; the Juanita was of secondary importance, followed by a number of lesser mines and many claims.

The construction of smelters for the reduction of the lead carbonate ores was just as important as mining to the growth of Socorro and Magdalena. Early smelting in Socorro and Magdalena was crude and simple. Lead carbonate ores, which could be reduced in an ordinary kiln, were simply mixed with the right proportions of fuel and fed into adobe furnaces. Metallic lead was collected as it ran out of the fire door onto the hearth. No slag was formed, and the dross from such crude operations retained a higher proportion of lead than some ores now rated as rich.

A plentiful supply of cheap coal at nearby Carthage was a distinct advantage for Socorro, which helped determine the locations of smelters. Good quality limestone was also readily available. The coal, reduced to coke, was delivered in Socorro at $8.00 per ton. The limestone cost $1.90 per ton. The first modern smelter to take advantage of these factors was the Billing smelter, built and put in operation at Socorro in 1883—the first and only custom smelter in the territory; a distinction it retained until 1891. During 1884, probably the peak year, the Billing works produced bullion valued at $1,078,266.59. In 1893 Billing sold the smelter to the American Smelting and Refining Company, which shut it down. The

Graphic Mining and Smelting Company also built a smelter at Magdalena, in connection with the Graphic mine. First mentioned in the *Socorro Sun* in 1881, it was called the New Orleans and La Joya Smelting Company; in 1882 it was sold to the Graphic Company. In 1885 it started full production and for 3 years, processed ores from the Graphic mine. In 1888 the smelter was closed down. A third smelter was constructed in Socorro in 1885, but was short-lived, as decreasing lead prices forced both mining and smelting to shut down.

The enthusiasm for mining in the territory and the special conditions that prevailed in the middle eighties led the territorial legislature to locate the New Mexico School of Mines at Socorro in 1889. By 1892 the new college had opened its doors amid great excitement. The building housing the school was the most modern and up-to-date educational facility in the American West. Its purposes were stated in the enabling act: "to furnish facilities for the education of such persons as may desire to receive instruction in chemistry, metallurgy, mineralogy, geology, mining, milling, engineering, mathematics, mechanics, drawing, the fundamental laws of the United States, and the rights and duties of citizenship." But the region, which had such great expectations in the eighties, was already declining, and while the School of Mines continued to serve New Mexico by supplying her with people trained in mining, metallurgy and the mineral sciences, Socorro had to give up hopes of becoming the mining and smelting center of the territory.

Far to the west of Socorro, in the Mogollon Mountains, one of the most interesting and productive of New Mexico's mining camps developed. Mogollon grew out of the discoveries made by Captain Cooney in 1875. Hostile Apache bands prevented much development until the mid-eighties when the Apaches were driven from the area. From 1885 until the end of the century, the story of Mogollon is as spectacular and exciting as the story of any mining camp in New Mexico. From a tent town hugging the bottom of the narrow canyon, Mogollon quickly grew into a rip-roaring mining camp near the adjacent camps of Clairmont and Cooney. From the bottom of the canyon, the town spread up the treacherous canyon walls of Silver Creek, terraced, braced, and reinforced with whatever was available to support the shacks and houses of miners and merchants. The efforts of the early miners are still visible at Mogollon today. With the miners came the camp followers, merchants, freighters, cardsharps, saloonkeepers, and others determined to "make it big," just as the miners hoped for a bonanza. Without a jail in these early, hectic days, yet with ample crimes of all kinds, miscreants were chained to a cottonwood tree for minor offenses, and hung from the same tree for major crimes.

Early production in the district came primarily from the Cooney, Little Fannie, Last Chance, and Maud S. veins, most of which had prominent outcrops. The productive area was less than 2 miles long by 1 mile wide, and lay west of the town of Mogollon. The gold that flowed so freely out of Mogollon during the 1890's accounted for most of New Mexico's fairly high gold output during the decade. In addition to gold, the ores contained a high ratio of silver. Incidental to the gold and silver which made up the bulk of the values at Mogollon, copper and lead were present, and must be counted in production figures. Records are sparse—particularly, accurate ones—but the district produced nearly $5,000,000 between 1885 and 1900. After 1900 the camp declined rapidly and nearly died. It had two major revivals in the 20th century and remained an active mining center until World War II.

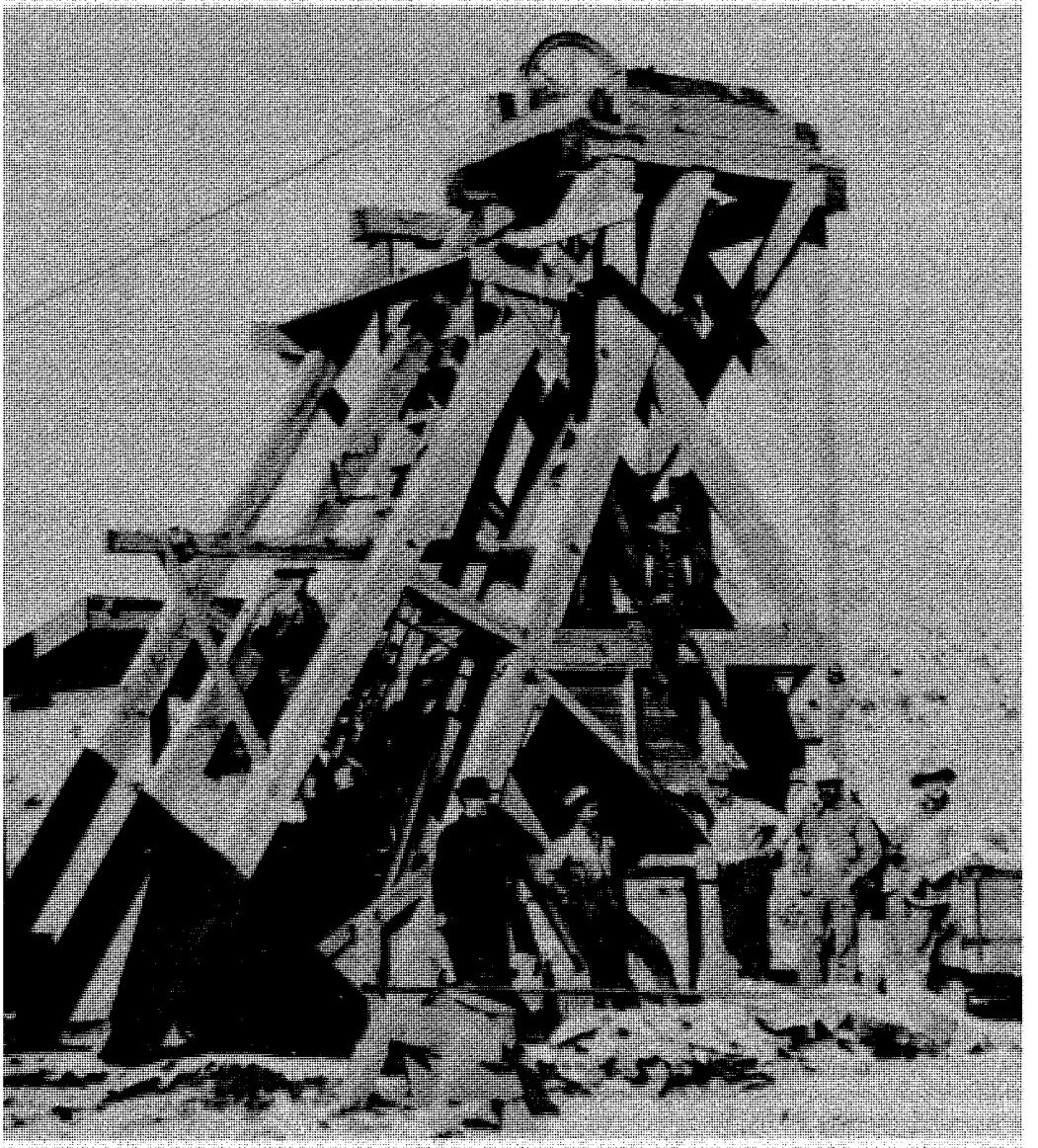
Most of the larger mines at Mogollon had mills in conjunction with them that developed concentrates and bullion. One of the more interesting milling

operations was built on Whitewater Creek, south of Mogollon; one of the gold discoveries in the district was just above Whitewater Canyon. The mines included the Confidence, Bluebird, Blackbird, and Redbird. In 1893 John T. Graham built a mill on the Whitewater to handle the ores from the mines. Whitewater Canyon is a narrow, sheer-walled gorge with a rapid drop out of the mountains. The mill was constructed where the rugged canyon ended and the stream entered a wide, gentle valley; here, the small town of Graham grew around the mill.

Whitewater Canyon presented special mining and milling problems to the Helen Mining Company, which operated the mines and the mill. The mill, powered mainly by electricity, could not be built close to the mines because of the rough canyon terrain. The stream frequently dried up at the mill site, while up the canyon, there was always a good supply of water. The town also needed water. These needs—water for generating electricity and for the town—were met by constructing a 4-inch metal pipeline which reached about 3 miles up the canyon. Built at the same time as the mill in 1893, the pipeline, packed in sawdust and encased in wood to protect it from freezing, followed the north side of the canyon. Anchor holes were drilled into the solid rock walls—sometimes 20 ft above the canyon floor—to hold the timbers and iron bars that supported the pipeline. In 1897 a second pipeline (18-inch) was built parallel to the smaller line to supply water to run a larger generator. The larger pipeline was in constant need of maintenance, and workmen who had to walk the pipe to keep it in repair dubbed it the "Cat Walk." These two pipelines were an outstanding example of the early-day engineering skills required to get the gold and silver out of the rugged Mogollons. Despite the large investment in time and money, the

Photo Collection, Museum of New Mexico

COONEY, NEW MEXICO, 1915. SMALL GOLD CAMP NEAR MOGOLLON IN WESTERN NEW MEXICO.



Henry A. Schmidt photo, Photo Collection, Museum of New Mexi

HEADFRAME OF THE U.S. TREASURY MINE, CHLORIDE, NEW MEXICO, CIRCA 1910. FOR MANY YEARS, THIS PICTURE APPEARED IN THE NEW MEXICO MINING-NEWS SECTION OF THE *Mining and Scientific Press.*

operation at Graham was a disappointment. The mill was inefficient, and the price of silver dropped drastically the year the mill was built, reducing badly needed revenue.

Adequate transportation never came to Mogollon. Rail connections were either at Silver City to the south or at Magdalena; both of which were out-of-the-way. Everything necessary to an active mining camp, machinery, tools, hardware, food, had to be hauled long distances by wagon over difficult roads. Ores,

concentrates, or bullion had to be hauled out by wagon or Wells Fargo Stage; over the same tough roads. The transportation problem was never solved, not even in the 20th century.

Like most mining camps anywhere, Mogollon had its share of legends; locally, one of the best known concerns the Apaches who hunted the area. In 1852 a prospector claimed to have met with a group of Apaches to trade with them. This particular group of Indians hunted with gold bullets, and being aware of the white man's love of gold, offered to trade some of their bullets for hardware and trinkets. Because they seemed to have a goodly supply, the prospector reported their source of gold must be enormous. He tried to talk the Indians into divulging their source of supply, to no avail. He even tried to trail them when the trading session was over, again with no success. He spent many years seeking their source of gold for bullets, but found only disappointment. The Indians were driven out of the area, the old prospector died, and the source of gold, naturally, has never been found.

On seeing Mogollon today, it is evident that production was once fairly heavy at several of the mines. The dumps are extensive; more so than at most of the old mining regions in New Mexico. Despite this, the town was never particularly opulent. Mogollon had more facilities than most other New Mexico mining camps, but few signs of substantial wealth remain, even though it existed as a mining town for nearly 60 years. The population may have numbered 2,000, evidenced by both the ruins and buildings still standing. It remains New Mexico's finest "ghost" gold camp.

Along the eastern flanks of the Black Range, a mining area developed which, while never a great producer, resulted in the founding of a number of small mining towns. The town of Chloride was the center of the district, but within a few miles, the camps of Grafton, Phillipsburg, Fairview and Robinson developed. The most frequently used picture of New Mexico mining activity that appeared for many years in the *Mining and Scientific Press* was the headframe of the U.S. Treasury mine just west of Chloride. The Black Range district was small, and over its brief life as a mining region in the 19th century, it produced only about $300,000 in silver. Harry Pye made the first discoveries in 1879, but Indian raids in 1881 left the founder dead and frightened off the other miners. In 1882 miners re-entered the area. One of these miners wrote:

> *We approached this range from Engle, a station on the AT&SF, fording the Rio Grande near old Fort McRea, and thence crossed the subordinate Cuchillo Negro Range, about halfway to Grafton, a mining settlement on the eastern flank of the Black Range. The whole of this region was considered so unsafe, both from hostile Indians and worse white Banditti (called rustlers), that it was thought necessary to provide a military escort, which, together with the guns carried by the party, gave us twenty-five Winchesters and two mounted scouts perfectly familiar with the country. The Ivanhoe Mine is that which has given to the Black Range its chief fame. All I can say is that I saw a powerful vein, which I followed for more than two miles from the town of Grafton, commencing at the Ivanhoe and passing the Buckeye, Surprise, Alaska, Montezuma, and so on, to the north and beyond, where I followed it to the Wild Horse. This Colonel Villette referred to as the Great Master Lode.*

For nearly a decade, the Black Range area experienced a minor boom.

By the early 1890's life went out of the boom, and Chloride and the surrounding towns settled back to quiet pastoral simplicity with mining continuing only on a small scale. In a letter from W. M. Armour to Bradford Prince, dated at Chloride, July 1893, Armour was inquiring about work. He

reported conditions in the vicinity of Chloride "very poor, with mining unimportant." In 1895, Armour wrote again, "I am the sole occupant of the upper Chloride Creek neighborhood."

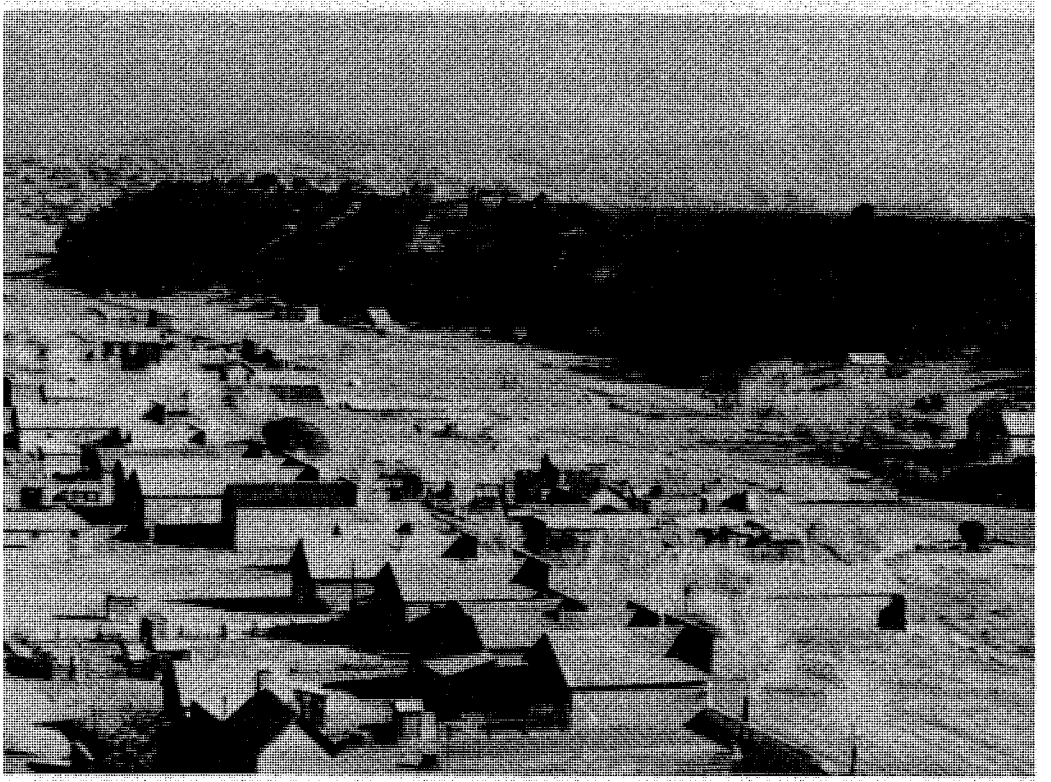
One other minor mining area developed in the central region: On the eastern side of the San Mateo Mountains, in Rosedale Canyon, gold was discovered in 1882. A small rush resulted, but was quickly snuffed out in raids by Geronimo's band of Apaches. The principal ore contained free-milling gold and small amounts of silver. Most of the ore mined in the 19th century was treated at the site by amalgamation and cyanidation in a 10-stamp mill, then the concentrate was sent to the smelter at El Paso for final processing. The Rosedale district, never more than a small camp with a few miners, produced sporadically until the 1930's.

Much of the general early development of central New Mexico can be traced to the mining activity that took place from 1880 to 1900. The mining boom also brought modern transportation, roads, smelters, businesses, ranches, and agriculture. When the excitement of mining subsided, the life and bustle also slowed; many of the camps survived and settled into a stable—though smaller—scale of living. But some of them died—ghost towns like Kelly, Mogollon, and Chloride—are mute testimony to the glory of central New Mexico in the last two decades of the 19th century.

In southwestern New Mexico, mining really took root and grew to massive proportions. The area did not have enough water to be an agricultural area, except in isolated valleys; cattle could be raised, if one had enough land, or if the ranch was located in mountains with enough rainfall to produce good forage, but the arid desert conditions made cattle raising difficult in much of the area. But it was suitable for mining. A great number and variety of highly mineralized districts dotted the region. Capital flowed in, as did miners and prospectors; the railroads contributed adequate transportation and access to smelters and markets; rich mineral deposits and ore bodies had been discovered, and just needed the proper circumstances to boom. Enthusiasm and optimism, building since the end of the Civil War, completed the picture. The combination of these forces resulted in beehive-like activity everywhere in southwestern New Mexico: Old mines were re-prospected, probed, and extended; new mines were opened, and prospectors scratched, hammered, and dug in every crevice and outcrop.

In 1880 most of the claims around Santa Rita were owned by J. Parker Whitney, who purchased the property from Matthew Hayes. Whitney deepened the Romero Shaft to 500 ft, where native copper was still in evidence in the form of fine metallic flakes. In 1881, Whitney built a concentrating mill and smelter at the mine, but neither was very efficient. He also increased the size of the property by acquiring additional claims. in 1883 it was reported:

> *The copper-works have been shut down since last April. It is understood that there are to be some changes in the machinery which have been found necessary. Cornish rolls will probably take the place of the stamps now in use, and everything will be overhauled generally and put in complete order for a permanent business. Tons of leaf and kidney copper and concentrates may be seen in different parts of the mill, which will be utilized as soon as things are in thorough condition for steady working. The company owns 56 patented claims, and now has apparently a large body of ore in the immediate vicinity of the mill at the depth of 300 feet from the surface. In many of the properties, considerable prospecting has been done with a diamond drill, and in one instance, at 800 feet, a body of water was reached which will rise 100 feet above the surface. The Company has an abundant supply of mineral and water*



Henry A. Schmidt photo, Photo Collection, Museum of New Mexico

CHLORIDE, NEW MEXICO.

within easy reach upon which it may begin operations as soon as its arrangements are completed.

Despite the rosy glow of this report, Whitney never made a major producer out of the Santa Rita. He simply did not have the capital. In 1897 he leased the property to the Hearst estate, whose interests included mining property at Pinos Altos and Gage, and cattle holdings near Silver City. The leaseholder did little to improve the property, and little mining.

As the 19th century came to an end, the mine changed hands again. Whitney sold out his interests to the Amalgamated Copper Company (which, it was said at the time, was associated with the Anaconda Copper Company), for the reported sum of $1,200,000. In addition, the Hearst people were to receive $200,000 for their lease and option. The new company took possession of the property in 1899.

While mining progressed slowly at Santa Rita during the last 20 years of the 19th century, two significant changes took place. First, considerable prospecting was carried out by relatively sophisticated methods that showed the great extent of the copper deposits. Men who could interpret the results of the extensive search began to realize the full potential of the Santa Rita. Second, the process of consolidation of mining claims continued, laying the basis for the massive mining effort of the 20th century.

The mines at Hanover, once called the best in New Mexico, were idle during the 1880's. In 1891, however, two discoveries in the Hanover-Fierro district brought the area back to life. Two important metal ores, iron and zinc, bypassed

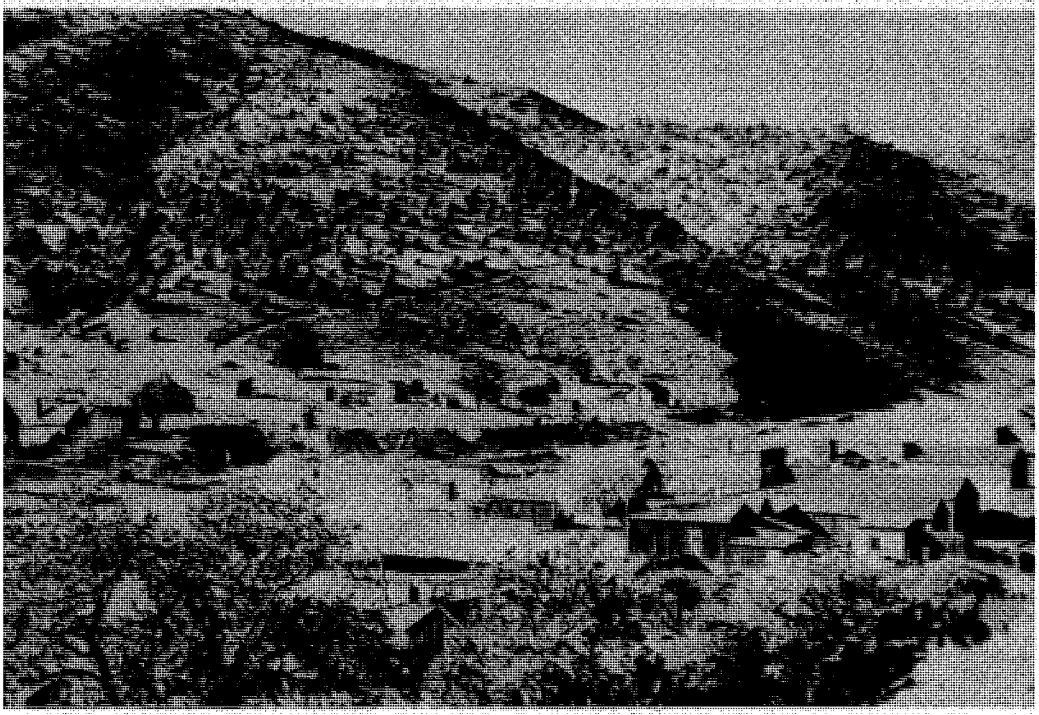
during the period of copper mining, brought the mines back as a major mining area, and a railroad spur was constructed to Hanover to handle them. Iron ore, produced steadily at the Hanover for many years, was shipped to Socorro for use as flux in the smelters during the early years. Later, the ores went to the El Paso smelters. In 1900 the Colorado Fuel and Iron Company contracted to smelt the iron ores, and continued well into the 20th century. Zinc production also started in 1891, and while it did not reach peak production until well into the next century, zinc ultimately became the most important mineral produced in the Hanover-Fierro district; at least in terms of value.

The old boom camp at Pinos Altos continued to decline in the eighties and nineties. Although activity at the mines and placers was continuous, the vitality was gone. Most of the mines in the area were controlled by the Hearst interests, and leased to various operators. In 1883 a newspaper reported: "There are about twenty-five men employed in placer mining in Pinos Altos, making a fair living. In many instances the dirt is carried several miles to water." In 1884, the Pinos Altos Gold and Silver Mining Company mill was shut down for lack of water. The same year, a group of miners attempted to reopen the old Pacific mine, but found little ore with commercial value. Reports on through the nineties told of little else. Pinos Altos could not compete with the new areas emerging in that part of New Mexico, and by the turn of the century, only a few diehards continued to work the mines.

Excitement at Georgetown continued high until the collapse of silver prices in 1893, then quickly died, never to return. During its peak, a daily stage line ran from Silver City to Georgetown, and in 1891 passenger trains were run by the Arizona-New Mexico Railroad into the silver camp. A newspaper called the *Silver Brick,* and later the *Georgetown Courier,* was published in the 1880's. Approximately $3,000,000 in silver was taken from the mine in Georgetown, helping Grant County earn the title, "Treasure Vault of New Mexico." The most important mine at Georgetown was the Naiad Queen: In 1888 it was turning out large quantities of high-grade ore that yielded 350 to 600 ounces of silver per day. The once famous camp lies in rubble today, with only a ruined chimney here and there to mark the site of the first silver camp in New Mexico. Its only inhabitants lie in the old cemetery.

The Steeple Rock district, nestled up against the Arizona border, developed into a significant gold and silver region during the last 20 years of the 19th century. The Carlisle mine was the primary producer. A 20-stamp amalgamating mill built in 1880 was later expanded to 60-stamps. In the late 1880's the Carlisle was sold to a British mining company, the Carlisle Gold Mining Company, Ltd., which operated the mine until late 1890 when the gold and silver ores were exhausted. Some mining continued through the nineties at other mines, but production never reached the high point of the previous decade. The ratio of gold to silver in the Carlisle ores was about 1 part gold to 15 parts silver. In addition to gold and silver values, a complex zinc-lead-copper-sulfide ore was found, but in 1887, efforts by the English company to smelt this ore failed. Estimates on production for Steeple Rock district during these years ran as high as $4,000,000—which is undoubtedly high. Probably a figure between $2,000,000 and $3,000,000 would be more realistic.

The Silver City area, with its adjacent Chloride Flat silver mining district, emerged as the center for mining and commercial activity for southwestern New Mexico. Several smelters were built to handle the ores from Georgetown, Lake Valley, and surrounding districts. In 1885 the smelters advertised they would accept "all kinds of ore, except lead ores, in any quantity from a burro load up."



Henry A. Schmidt photo, Photo Collection, Museum of New Mexico

KINGSTON, NEW MEXICO, CIRCA 1890.

The mines at Chloride Flat, one of the earliest silver mining areas in New Mexico, continued to produce silver until 1893 when silver prices collapsed. Prior to 1880 the Chloride Flat district produced slightly over $1,000,000 worth of silver; between 1880 and 1893, it produced another $3,000,000 in silver values. Just southeast of Silver City, the Lone Mountain district added its silver output to that of the Chloride Flat district, and thus helped in the development and fame of Silver City.

In the Burro Mountains west and southwest of Silver City, a number of mining districts developed. This mining region was one of the oldest in New Mexico, having been mined by the Indians, the Spanish, and finally, the American miners. The old copper deposits produced little in the last part of the century, though there was almost constant effort to find suitable and profitable ores. Some turquoise was found, but never in substantial quantities. An interesting mining operation opened in 1881 at the Burro Chief mine near old Tyrone. Fluorspar, used as flux in the nearby smelters at Oak Grove and Silver City, was mined here for many years. In addition to the Burro Mountain district, other districts emerged, such as the White Signal, Anderson, Clarks Peak, and the Telegraph, in which various amounts of gold, silver, copper, and lead were found. Some of these areas produced good values for brief periods. In 1881 gold was discovered at Gold Hill in the northern part of the Burro Mountains. Several new districts, including Gold Hill, Malone, and Black Hawk, developed quickly. For a short time in the 1880's nearly 500 miners lived at Gold Hill. Despite the activity, significant mining enterprises in the Burro Mountains were not established until after 1900.

Near the south end of the Black Range, three camps burst on the mining scene after 1880, which, between them, had fabulous productivity. The three, Hillsboro, Kingston, and Lake Valley, formed a triangle of metallic brilliance. Although all three became productive in the early eighties, each had essentially ended its career as a mining camp by the end of the century. If production estimates are accurate (which is doubtful), then the combined total for these camps is impressive: Kingston, $6,250,000; Hillsboro, $6,750,000; and Lake Valley, $3,250,000—for a grand total of $16,250,000 over a 20-year period. Kingston, primarily a silver camp—as was Lake Valley—had the distinction of being the richest silver producer in New Mexico during the 19th century. Hillsboro, basically a gold camp, boasted both lodes and placers. Kingston and Hillsboro, just 9 miles apart, were typical New Mexico boom camps; like Topsy, they "just growed," using whatever was available for construction material. Styles were makeshift and often crude, with little sign of opulence in either camp, despite the vast amounts of silver and gold found. Declining silver prices, exhaustion of the rich ores, fire, and floods dimmed their glory, and they settled for the status of quiet artist and resort centers.

Lake Valley, while never the size of Hillsboro or Kingston; was the railhead and communication center for all three camps. The railroad to Lake Valley went to Nutt Station; then to Deming, where it connected into the Southern Pacific system. Ores and concentrates from the mines at Kingston and Hillsboro were brought to the railhead by wagon, and supplies for both camps fed through Lake Valley. Although the mines at Lake Valley were never as rich in total production as the other two in the trilogy, they embraced some of the richest pockets of silver ever found anywhere in the world. The largest of these, the Bridal Chamber, produced 2,500,000 ounces of silver, much of which was horn silver; so pure that it was sawed and cut into blocks instead of being blasted. One contemporary account said, "The ore body is so rich and porous that at many points a candle flame will melt it into silver globules." The Chamber measured roughly 100 ft square, and 10 to 20 ft thick. A second find, the Thirty Stope, yielded 1,000,000

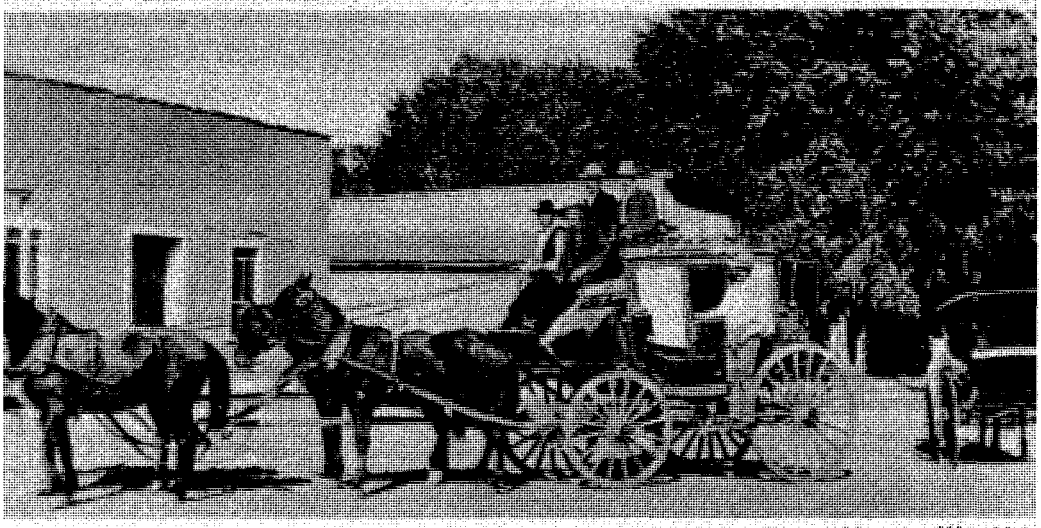
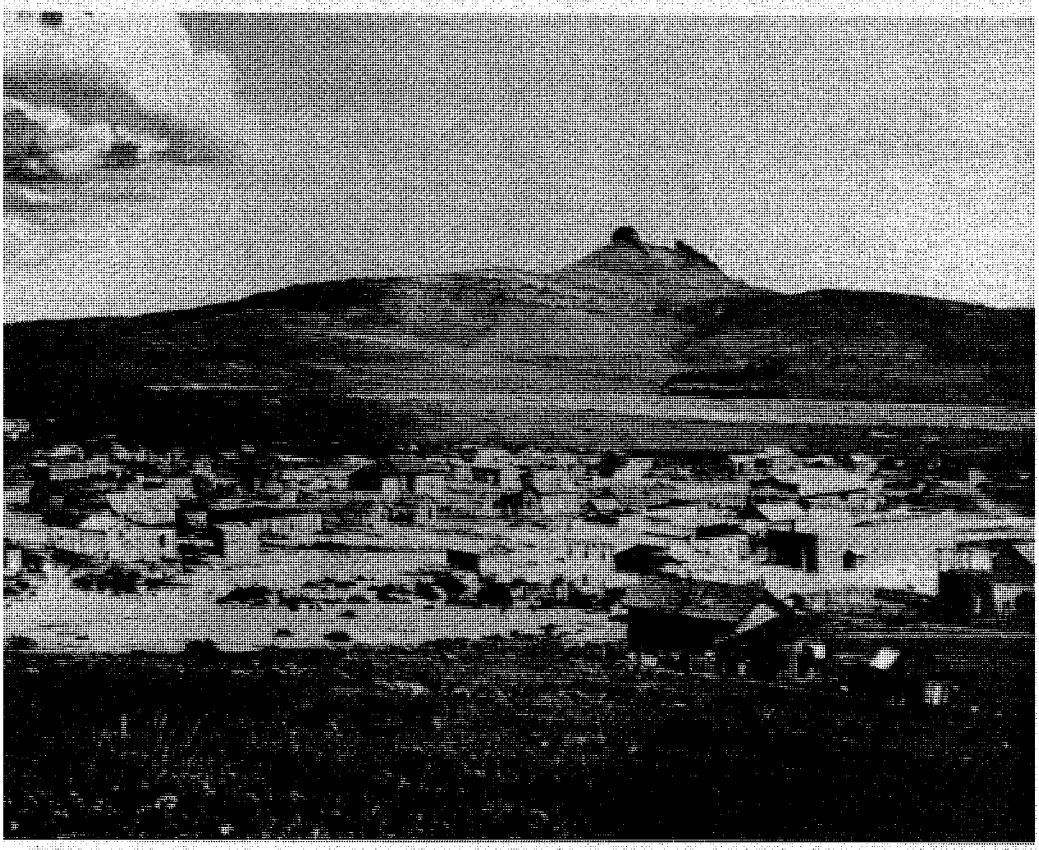


Photo Collection, Museum of New Mexi

STAGECOACH PREPARING TO LEAVE HILLSBORO, NEW MEXICO, LATE 19TH CENTURY.



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LAKE VALLEY, NEW MEXICO, CIRCA 1890.

ounces of silver. It measured 125 ft long, 12 to 30 ft deep, and 90 ft wide. The Lake Valley properties produced from 1880 to 1893; then the town died. The author visited Lake Valley in June, 1970, and while observing the dead town from a slight rise to the south, wrote this impression:

> *The descriptions I have read regarding the boom period of the past gave a very different view of this place than one can gain from seeing Lake Valley today. Only two families still live in the town. It is desolate and depressing, snuggled against the base of a range of barren hills. There is little sign that there was wealth in any period. It was never very large. There was no sign of much available water. The Bridal Chamber, which in part gave the town its fame, is a gaping hole. There are few trees, even in the distance. If there was ever wealth, over and above a simple living (day wages or small profits from business), it must have been exported.*

Not a very pretty epitaph for a town that claimed the Bridal Chamber and the Thirty Stope as a part of its history. All three, Lake Valley, Kingston, and Hillsboro lost much of their output to absentee owners, much of it going to foreign investors.

Except for a brief flurry of activity after the Southern Pacific Railroad completed its line into Lordsburg in 1881, the area, incorporating the Shake-

speare, Pyramid and Virginia mining districts, produced little during the 1880's and 1890's. In 1882 a smelter was erected at Shakespeare, but it never treated much ore. Later in 1882 a 20-stamp pan-amalgamation mill was built at Pyramid, south of Lordsburg. It operated for 10 years. The major mines in the Lordsburg area were the 85 Group, the Last Chance, and the Viola (Venus). Although silver was the primary metal sought in the early years, there was some gold. After 1893 mining in the region declined rapidly. Right at the turn of the century, the area began to revive as a copper producer when the price of copper rose to 17 cents a pound. The greatest period of productivity around Lordsburg came in the 20th century.

East of Lordsburg, and just south of Gage (a station on the Southern Pacific Railroad), the town of Chance City came into existence, briefly, in the 1880's. Chance City was a mining camp established in conjunction with the Chance and Jessie mines in the Victoria Mining district, 3 miles south of Gage. Mining began at the Chance and Jessie mines about 1880, resulting in considerable activity and production in the district through 1886. The principal mineral was lead (oxidized argentiferous ores), but good silver and some gold were recovered as byproducts of the smelting process. Production estimates for the district go as high as $1,500,000. Although there were other mines in the district, they were comparatively small.

The Chance mine was owned by George Hearst (father of William Randolph Hearst), Lloyd Tevis, and James Ben Ali Haggin (whose mother was Turkish, hence his middle name). Tevis and Haggin, San Francisco attorneys, quit practice to become moneylenders, then land speculators, and finally, mining promoters. They were clever, shrewd, ruthless men; highly respected in San Francisco, where they headquartered. They had considerable capital but no mining savvy. George Hearst, it was said, could smell gold or silver; and Tevis and Haggin backed him to form a partnership. One of their most famous properties was the Homestake mine in South Dakota.

During its peak, the Chance was opened by shaft to a depth of about 200 ft. The first of several levels, the main ore-producer, had crosscuts and drifts totaling 700 ft of exposed ores. Ore ran about $40 a ton, including lead, silver, and gold; and was shipped to the Bensen Smelter in Arizona. About 25 men were employed at the Chance mine in 1883; assuming a similar number worked the Jessie, and a few other miners worked the smaller mines, then Chance City must have had about 70 miners, plus a few miners' families, merchants, etc. The total population could not have exceeded 130 people.

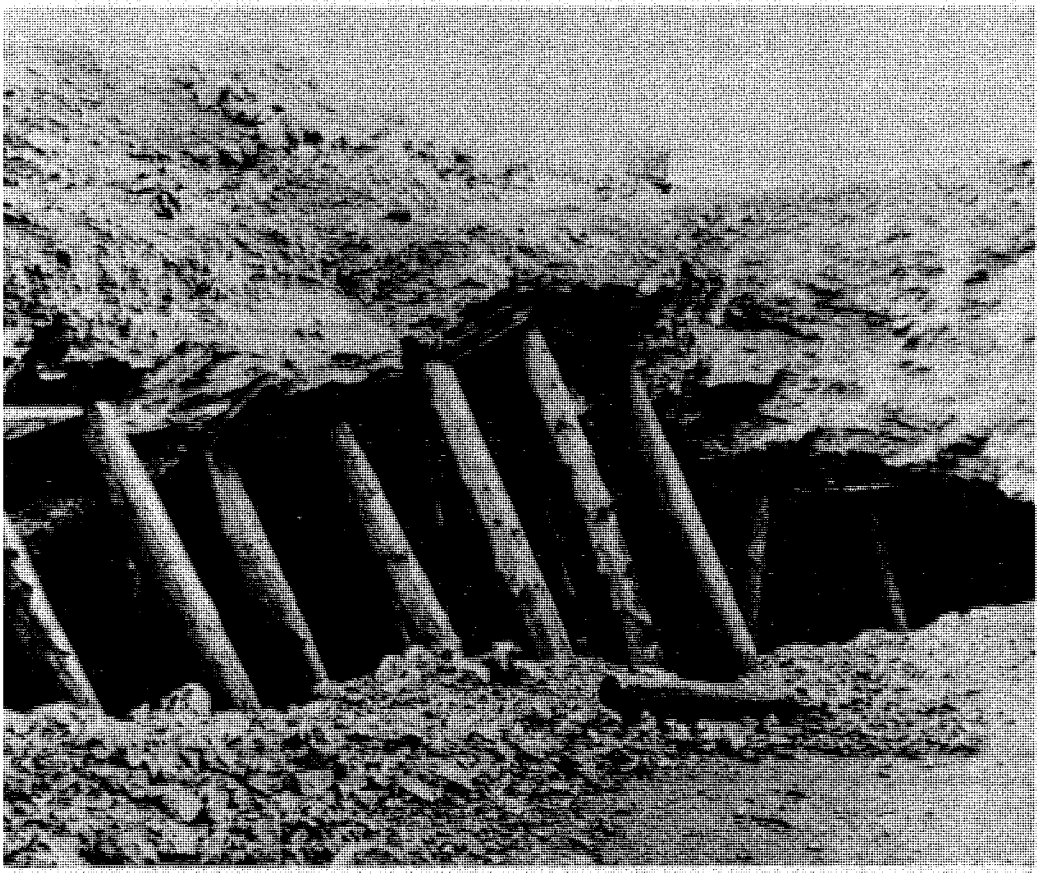
By 1886 mining came to an end around Chance City. Ores became more costly to handle and the price of lead dropped. There was a small bustle of hopeful activity around the old works at the turn of the century, with little success. Although the mines at Chance City operated only briefly, they were important lead mines, and were the early basis for extensive holdings by George Hearst; and later his estate in southwestern New Mexico.

Several smaller mining districts developed in far southwestern New Mexico. Twenty-five miles south of the Southern Pacific line lay the Monument district, part of it in old Mexico. It was discovered by Volney Rector of Santa Rosa, California, in November 1880. He and his brother worked the U.S. Treasury mine and the Sub-treasury mine; the latter, in Mexico. Except for brief periods during the summer rainy season, water was almost nonexistent, and very little production ever came from the district. A bit north of the Monument district was the San Simon or Granite Gap district. Like so many other regions in the southwestern part of the territory, it was first explored in 1880. Lead and silver

ores were the attraction, and the district produced nearly $500,000 by 1900. Large-scale mining operations begun at the turn of the century failed to make the district very important. In the Florida Mountains south of Deming, some mining activity in the 1880's was concentrated primarily on lead ores, although there was some silver and copper. Of the nearly $75,000 extracted from the Florida Mountains in the last century, about $60,000 was mined before 1885.

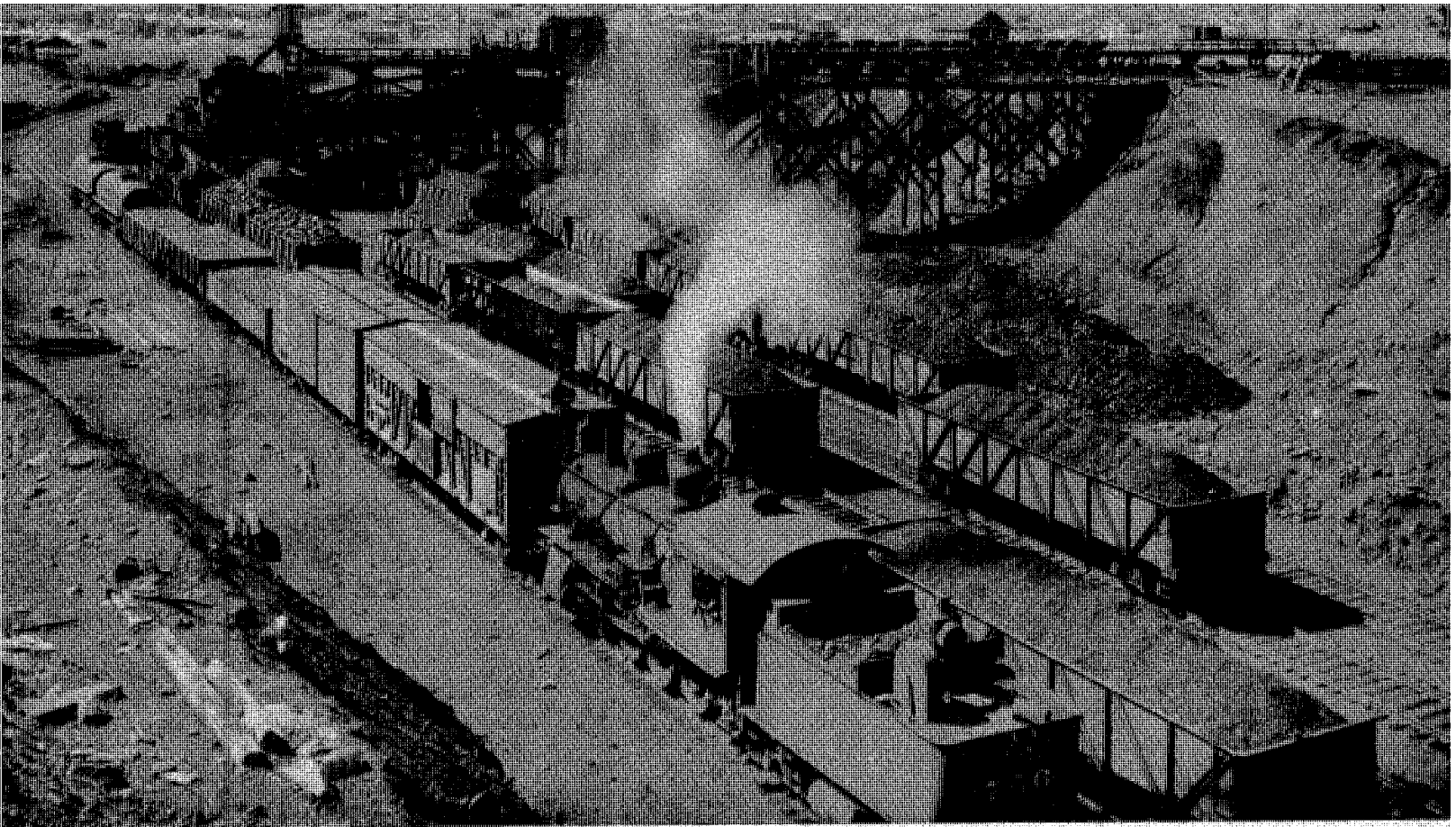
Other regions in southwest New Mexico produced some mineral wealth, but they were small and isolated, and did not add significantly to the total production. The major areas were spectacular, however, and generated an excitement and enthusiasm for mining that brought the region the greatest activity it had seen in a century.

In addition to metal mining, several developments in New Mexico during the last decades of the 19th century involved other minerals; the most important of these was coal. Until 1880, coal mining in New Mexico was localized, and coal was used mostly as domestic fuel. With the railroad age, coal mining quickly came into prominence in the territory. The growth of railroads in turn stimulated the growth of smelters, also heavy users of coal products.



Henry A. Schmidt photo, Photo Collection, Museum of New Mexico

THE "BRIDAL CHAMBER" AT LAKE VALLEY, NEW MEXICO. OUT OF THIS HOLE CAME ONE OF THE RICHEST BODIES OF SILVER IN THE HISTORY OF WORLD MINING.



T. Harmon Parkhurst photo, Photo Collection, Museum of New Mexico

ACTIVITY AT MADRID, NEW MEXICO, COAL MINES, CIRCA 1900.

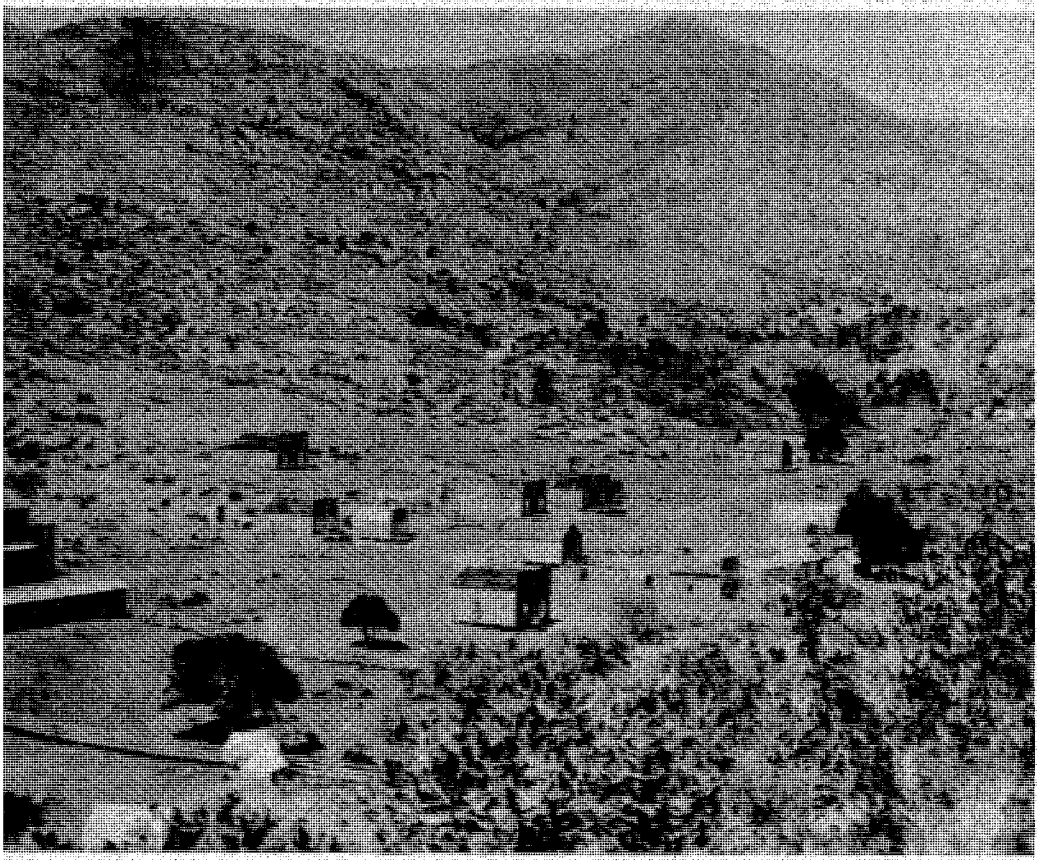


Photo Collection, Museum of New Mexico

FLEMING CAMP, SOUTHWESTERN NEW MEXICO, EARLY 1880'S. AT THE TIME, MANY CLAIMED THIS TO BE THE SITE OF THE FAMOUS ADAMS DIGGINGS.

Thus, after 1880, coal increased in prominence as a major mineral product of New Mexico. In the Gallup area, demand for coal resulted in the establishment of a number of mines in the 1880's, among them the Gallup Coal Company, the Aztec, the Black Diamond and the Crown Point mines. In 1888 these mines had a combined production of nearly 300,000 tons, valued at approximately $600,000. They employed 400 men, and contributed substantially to the growth of the Gallup area.

In northeast New Mexico, west of Raton, other coal beds were discovered and developed. The mines at Blossburg, and later, the mines at Dawson, were important suppliers for the Santa Fe Railroad. Capitan field, east of Carrizozo, was tapped by the El Paso and Northeastern Railroad, a line later purchased by the Phelps-Dodge Corporation to assure ample fuel for its smelter at Douglas, Arizona. Around Cerrillos, an ancient mining district, coal mining came of age with the advent of the railroad. The mines near Madrid, now a ghost town, developed quickly, supplying high-quality coal for the Santa Fe. Farther south, at Carthage, southeast of Socorro, coal joined lead and silver as a major mining product. Its markets were domestic use, the Santa Fe Railroad, and several smelters in Socorro and Magdalena. During the 1880's and 1890's, coal was

mined at both Monero and Amargo, west of Chama, near the Colorado line; most of it was utilized by the narrow-gauge lines of the Denver and Rio Grande-Western Railroad. By the end of the century, this relatively unromantic, little prospected, industrial mineral became the leading product of New Mexico mining; due in part to the high demand for coal, and in part to the collapse of silver prices—and ultimately silver mining—after 1893.

Iron ore production was also critical during these years, not so much for the metal content, but the ores themselves were important as flux in the smelting process. Iron for the early smelters in Socorro was first found as nodules lying on the surface a few miles west and north of Magdalena. Gathered by hand and hauled to the smelters by wagon, the supply of these nodules of iron ore was soon exhausted, and a more dependable source was needed. In addition to supplying most of the needs of the territory, the mines at Hanover and Fierro fed the blast furnaces of the Colorado Fuel and Iron Company at Pueblo, as well. Total iron production in New Mexico during the 19th century, however, was minor.

Prior to 1880, an overview of New Mexico mining was fairly simple because the excitement, the rushes, the productivity, and the written material relating to mining was localized, and few areas were affected. After 1880 the picture changed dramatically. So many areas emerged as mining centers and so many more showed great promise, that the story became complicated and confused. Instead of small, isolated mining districts, one must think of regions. Instead of a few minerals, one must deal with a variety. As a result of this change in condition and attitude, the nature of mining began to change, along with the social and political aspects of mining regions. The tendency was to larger and larger units: larger mining districts, larger companies, larger capital outlays, larger production, bigger and better mills, expanded transportation facilities, more law, and bigger taxes. While the traditional small mining camp, with its multitude of individual miners and its local mining law, continued as an important factor; the changeover, although slow and subtle, was progressive, until by the end of the century, New Mexico miners had abandoned the old forms for the new, and a new epoch in mining history emerged.

Mining Potpourri

While prospectors' dreams, glory holes, boom camps and mining districts made up the most romantic part of the story of 19th century New Mexico mining history, they were not the whole story. A number of fringe areas hinted at in preceding pages, often without further explanation, should be explored. One area, mining law, was critical to the miner's claim, placer or lode; his water rights (if there was any water), and the society he tried to develop out of the raw mining camp. His methodology, both in mining and ore reduction, had interesting facets. Where the miner got his capital—and how—was another aspect of the story. Transportation, at least that which developed in addition to the railroad, had to be included. And then there were such things as wages, taxes, the social life in the camps, and the ever-present power of the press. Woven into the story of searching prospectors and sweating miners, these elements combine to make a whole fabric.

The true origins of American mining law evolved from the great synthesis of Roman and Germanic elements which we call Medieval. This specialized form of law and social organization grew out of the Germanic codes of the 12th and 13th centuries, and is commonly called "Germanic mining freedom." It appeared in the form of local custom in centers of original German mining, and permitted all persons to search for useful minerals, granting the discoverer the rights of property (within certain limits). This principle of free mining emigrated with the German miners, and applied to all places their influence extended. Original local custom became general law. In this existence of an estate in soil lies the distinctive character of Germanic mining law. Eminently a special law, it is coordinate, rather than subordinate to civil law. Since German mining began, certain vital principles have been asserted by the men of camp, district, and mining town. The local law, whose sources are as old as the capitularies of Charlemagne—probably far older—is a living force in the world today.

These early customs were refined by English common law and in the Spanish mining camps, both of which had a deep influence on later development of American mining law. However, truly American mining law came into existence with the discovery of gold in California in 1848.

Discovery of gold on the public domain of the United States in the relatively inaccessible region of California, and the rapid influx of thousands of miners and adventurers created a unique set of conditions which resulted in an equally unusual set of legal solutions. In theory, Mexican law in California was replaced by American law. In reality, little law of any kind was in evidence, and the newly acquired territory was ruled by a military governor. Faced with a near-impossible situation in regard to the administration of the law, the governor's decision was:

> *upon considering the large extent of the country, the character of the people engaged, and the small, scattered force at my command, I am resolved not to interfere, but to permit all to work freely, unless broils and crimes should call for interference.*

Left by the military governor to "work freely" in a country where general law was undefined and largely unenforceable, the mining population adopted a system of miners' regulations enacted at meetings of the miners of self-created mining districts. The resulting rules were drawn from a mixture of Spanish-Mexican and Anglo-American influences. These regulations, voted at the early miners' meetings, applied to many things beyond the legal jurisdiction of such assemblages. For example, they imposed banishment for Asiatics, whipping and banishment for practicing lawyers, and death for murderers, horse thieves, and

mule thieves. These areas were ultimately ruled beyond their jurisdiction, but so far as they prescribed rules about mining matters, they were, in general, legally valid.

"Trespassers" upon the public domain, and far from the seat of the government, the swarming thousands had to create laws adapted to the extraordinary conditions that confronted them. They accomplished their task so well that the rules and customs adopted by the miners, first in California and later in other territories and states, received the approval of the court, of local legislatures, and finally, of the federal Congress. These early mining rules and customs that related to district boundaries, size and method of location of claims, keeping of records by a district recorder, the amount of work required to keep a location alive, how claims could be forfeited, when they should be deemed abandoned, and other minor items, were the foundation stones upon which American mining law was built. They have been called the American common law of mining.

During the 1850's, more stable political and legal machinery came to California, and the legal customs wrought in the wild mining camps of the High Sierra came to be formalized in decisions of the California courts and in the acts of her legislature. Thus emerged a system of law with origins among the folkmoot of California. By 1861 the miners' customs, usages, and regulations had spread outward from California, a state whose court decisions were almost universally followed and were recognized in other states and territories of the west, including New Mexico. By 1865, a Justice of the Federal Supreme Court wrote:

> *A special kind of law, a sort of common law of miners, the offspring of a nation's irrepressible march—lawless in some senses, yet clothed with dignity by a conception of the immense social results mingled with the fortunes of these bold investigators—has sprung up on the Pacific coast, and presents in the value of a 'mining-right' a novel and peculiar question of jurisdiction for this court.*

Throughout the American West, a considerable variety of rules were apparent at the local level. Some regulations were patterned after those of Spain or Mexico; others tended to copy those of England. Claim size, whether lode or placer, varied from place to place; most regulations forbade absentee ownership. Monopoly was discouraged, claims were small, and the number of claims an individual could own was often restricted. All regulations provided some means of settling disputes, usually through arbitration by a person or committee designated by the miners of the district to handle such matters. Most of their actions, generally concise and clear, required no lawyers and could not be appealed to a higher court.

New Mexico followed the patterns of other western states and territories, and camp law was copied from California models. An early example in Rio Arriba County was reported in the *Weekly New Mexican* of June 1, 1869:

CHAMA MINING DISTRICT

Rio Arriba County, N.M.
May 25, 1869

On the day above written the miners upon the Chama River met and organized a meeting for the purpose of making a code of laws for the government of this District.

E. D. Thompson was elected President and D. Catanach Secretary.

The meeting being thus organized, Mr. John Ayers moved the adoption

of the following laws, which were unanimously adopted, and the laws agreed to as valid and binding in this District.

LAWS

Article 1. That this mining district shall be known as the "Chama Mining District" and shall extend from two miles west of the Arroyo Seco ten miles down the River Chama, and shall include all territory for 2½ miles upon each side of the River.

Article 2. A placer claim in this District shall consist of two hundred feet front on the River and shall extend back at right angles to the general course of the stream in front of said claim to the highest point of the hill.

Article 3. Any person shall have the right to hold one claim by the method, viz: The claim shall be staked off in the presence of two witnesses and shall within the period of one week be recorded by filing a statement of the location of said claim with the Recorder of this District, so described as to be recognizable by parties conversant with the District; such filing shall hold the claim during the period of three months, within which time, however, it shall be necessary and obligatory upon the party desiring to hold said claim to sink a hole, shaft or drift sufficient in extent to excavate ten cubic yards of material; a compliance with the above conditions shall entitle the holder of a claim to his right thereto until a ditch shall be constructed that shall enable him to work said claim; provided, that in case any claimant shall refuse or neglect to commence working and developing his claim thirty days after such compliance of a ditch and opportunity for procuring water, all his rights and title shall thereto lapse and his claim shall become null and void.

Article 4. There shall be a recorder elected whose duty shall be to keep a book of Records wherein he shall faithfully record and keep a copy of the claims filed by the miners and who shall be entitled to two dollars each for his services in filing such claims, to be paid by the claimant at the time of such filing.

Article 5. When gulch claims shall be discovered in this District, a claim shall be three hundred feet in length following the course of the gulch and extend the entire width thereof.

Article 6. That the mining law of the Territory shall govern in relation to all quartz claims that shall or may be discovered in this District.

The motion was then made that the meeting do now proceed to the election of a Recorder, which being carried and a vote being had Mr. John Ayers was declared unanimously elected.

D. N. Catanach	E. D. Thompson
Secretary	President

The need for more formal law in New Mexico brought action from the territorial legislature. On January 18, 1865, the legislature provided a legal basis for mining development that essentially reaffirmed the work done at the local level by several generations of miners in mining camps strung out through California, Montana, Colorado and New Mexico. In 1866 the Federal Government passed legislation supporting both territorial laws of mining and local *Rules of Miners.* The essential features of the 1866 act were: 1) The declaration

> *that the mineral lands of the public domain, both surveyed and unsurveyed, are hereby declared to be free and open to exploration by all citizens of the United States, and those who have declared their intention to become citizens, subject*

> *to such regulations as may be prescribed by law, and subject also to the local customs or rules of miners in the several mining districts, so far as the same may not be in conflict with the laws of the United States.*

2) a provision giving extralateral rights, 3) a provision for patenting of lode claims, with a provision for adverse suits, and 4) a provision recognizing and protecting water rights vested by priority of possession. As incomplete as the act was, Congress recognized its moral obligations that had been set out by the Supreme Court. The court said:

> *We know that the territorial legislature has recognized by statute the validity and binding force of the rules, regulations, and customs of the mining districts. And we cannot shut our eyes to the public history, which informs us that under this legislation, not only without interference by the national government, but under its implied sanction, vast mining interests have grown up, employing many millions of capital, and contributing largely to the prosperity and improvement of the whole country.*

The act of 1866 was amended by an act of July 9, 1870, which provided for the patenting of placers. In 1872 another general mining act was passed by the national Congress which further refined and developed national mining law in regard to the public domain. New states and territories quickly followed suit and built legislative structures in accordance with the federal laws. These various acts set the patterns for mining-law development during the remainder of the 19th and 20th centuries.

The methods and technology applied to mining in New Mexico during several hundred years of mining activity were those tried and tested in other regions, with local modifications. Before 1900 there was little local invention or experimentation with methodology. Frequently, great losses of valuable minerals occurred simply because New Mexico miners, with no one to tell them differently, applied the wrong process to the ores. Until the coming of the railroads in 1880, mining and metallurgical techniques were restricted to essentially rudimentary, non-technical methods. Ores, dug by hand with a minimum of mechanical aid, were crushed by the most primitive methods, and treated without the benefit of technology available in the eastern part of the United States and in Europe. The result was gross inefficiency that frequently wasted more of the sought-after mineral than was recovered. After railroads made possible the relatively cheap importation of processing equipment into New Mexico, and capital was available to make the purchases, mining and smelting in the territory became more standardized in comparison to other mining regions of the United States.

In the early days, gold was the most sought-after mineral, and placer gold mining was the simplest and most direct method, usually preceding other forms of mining in early western history. Placer gold was found in the gravels of both ancient and modern stream beds. Certainly the symbol of early mining has to be the miner, with shovel and gold pan, crouched over a stream—washing gold from gravels. The method was universal: only the nature of the washing device varied. Spanish and Mexican miners used the batea, or wooden bowl, similar to the American miners' metal pan, though some claimed it was more efficient. Some New Mexico miners used a sheep's or a cow's horn cut lengthwise, with some success. In all cases, the methods were the same, as were the results. Vital to all was water, for without the action of water in the pan, the particles of free gold were most difficult to separate from the gravel and sand. Lack of adequate water in most areas of New Mexico severely limited placer operations.

The gold pan had limitations, even when adequate water was available. First, only the coarse gold could be recovered with the pan alone—fine and float-gold

was carried off and lost with the water and gravel. Second, the amount of gravel that could be worked was small, even when the art of panning was mastered. Only the richest gravels produced much wealth by this simple, direct method.

The use of quicksilver (mercury), became essential in the recovery of placer gold. The quality of mercury to readily combine by amalgamation with precious metals, particularly gold and silver, made the mercury flask as much a part of the miner's equipment as his shovel and gold pan. When the coarse gold had been removed from the pan, leaving fine sand and fine gold, mercury was added to the residue, all of which was held in a container until the day's panning was done. Later, around the campfire or in a lonely cabin, the gold-bearing amalgam was heated in a retort. The gold was freed from the mixture by vaporization of the mercury, which was condensed and recovered for the next day's operation. Later, the gold was hidden in the hearth, or some other safe place.

Pans, the batea, and the horn spoon were prospecting tools rather than mining implements. They were, and still are, used in new fields, both as prospecting and working tools, while the pay dirt is rich. When gravels became poorer, and larger and larger quantities had to be worked, these crude implements were discarded in favor of mechanical devices capable of processing greater amounts of gravel. The complete spectrum of devices utilized to increase production cannot be listed here, but a few of the more important and interesting ones are discussed.

The "cradle" or "rocker" was one of the first devices to replace the pan. This was a box on rockers, covered with a grating (or "riddle"), about 20 inches square. The gravel was placed on the riddle, and water was poured on, carrying the pay dirt through the grating. The dirt fell on an inclined blanket-covered apron, and was carried to the back of the lower chamber. The whole cradle was slightly inclined to the front so that all the dirt and water put in at the top ran down the apron and out the front. The bottom had a series of riffles which captured the coarse gold. The finer gold, hopefully, was trapped on the blanket-apron. A considerable amount of water was needed for the cradle, about four times the weight of the gravel to be washed. Although the output of the cradle was small and recovery of gold inefficient, the cradle was an improvement over the pan.

The "Tom" was another early device that improved upon both pan and cradle. Made from two wooden boxes, the Tom required a flume for its water supply. Consisting of an upper box about 14 ft long; 20 inches wide at the upper end and 30 inches at the lower, it was inclined about 1 inch to the foot. The lower end was cut off at a 45 degree angle and covered with a grating that let everything but the larger stones pass through. This first box ended over a second box about 3 ft wide and about 12 ft long with a series of riffles along the bottom. Mercury was poured into the riffles, where the gold was then trapped. Sometimes, pieces of blankets were laid between the riffles to trap the finer gold. A flume fed water into the upper box. One or more men fed the Tom gravel, another stirred the gravel, broke up pieces of clay, and discarded the larger stones that collected at the grating. The Tom was useful only where the gold was fairly coarse, as most of the fine gold was lost. Using the Tom, two men could wash five times as much gravel as they could with a cradle.

Sluice mining was the most important development in shallow placer operations. The "sluice" was invented in California and became popular throughout placer gold districts in all the western states and territories. A simple device, yet a tool of great value, it was made of rough, unplaned boards and was almost any length over 50 ft. The width was usually 16 to 18 inches, although some were as narrow as 8 inches. Varying from 9 inches deep to almost 2 ft deep,

the sluice was made in sections, usually 12 to 14 ft long, depending on the local sawmill. Each section was called a "box," and a sluice was said to be made of so many "boxes," which indicated its length. The bottom boards of each box were sawed specially and were 4 inches wider at the upper end. This allowed the lower end of one box to fit into the upper end of the box below. No effort was made to seal the box, as joints swelled shut from water, or shortly filled with sand. The sluices, resting on trestles, usually had a fall of about 8 inches per box. Plenty of water was necessary for successful operation. Riffles, sometimes wood—often iron—were wedged in the sluiceboxes. These caught the gold and held the mercury which was added with the paydirt along the sluice. The action of water rushing through the sluice broke up the clay and carried off the coarse material, depositing the gold in the riffles along its course. Six to ten days of work could be done before a "clean-up" was necessary. This involved recovery of both the coarse gold and the fine gold mixed with the mercury. Some sluices in operation in California were several thousand ft long. Sluice mining was carried out at E'town, White Oaks, and Pinos Altos, when water was available.

Lode mining methods prior to 1880 are difficult to generalize, as much of the work was undocumented. Many old shafts and drifts that might have given a clue to methodology have been modified or obliterated by later operations. By-and-large, the early miners needed several things: They needed a rudimentary knowledge of the use of black powder—in most areas, explosives were needed to break up the rock and thus make it possible to follow a vein. The rest was just plain backbreaking work. Pick and shovel were essential implements, as much of the ore was backpacked or hauled in a wheelbarrow to the sorting area or dump; or, at really a rich mine with ample capital, small cars on wooden tracks hauled the ores, and finally, the ores were hand-sorted for processing. The volume of material moved depended upon the amount of musclepower applied, and generally the quantity was small. If available, and if they could be afforded, mules or horses were used for some of the work. Human labor, however, was the key, and the successful miner was one who had an adequate ore supply and was willing to put in long hours of work. Few miners prior to 1880 could afford the luxury of mechanical devices in place of men.

WORKING THE "ROCKER" IN A PLACER OPERATION.
Photo Collection, Museum of New Mexico

Converting ore to bullion required considerable ingenuity before the advent of heavy machinery. Three methods of preparing ore for treatment are discussed here because of their interest and importance to New Mexico mining: the arrastra, the Chilean mill, and the California stamp. These reflect both the technology of the Mexican and the California miners.

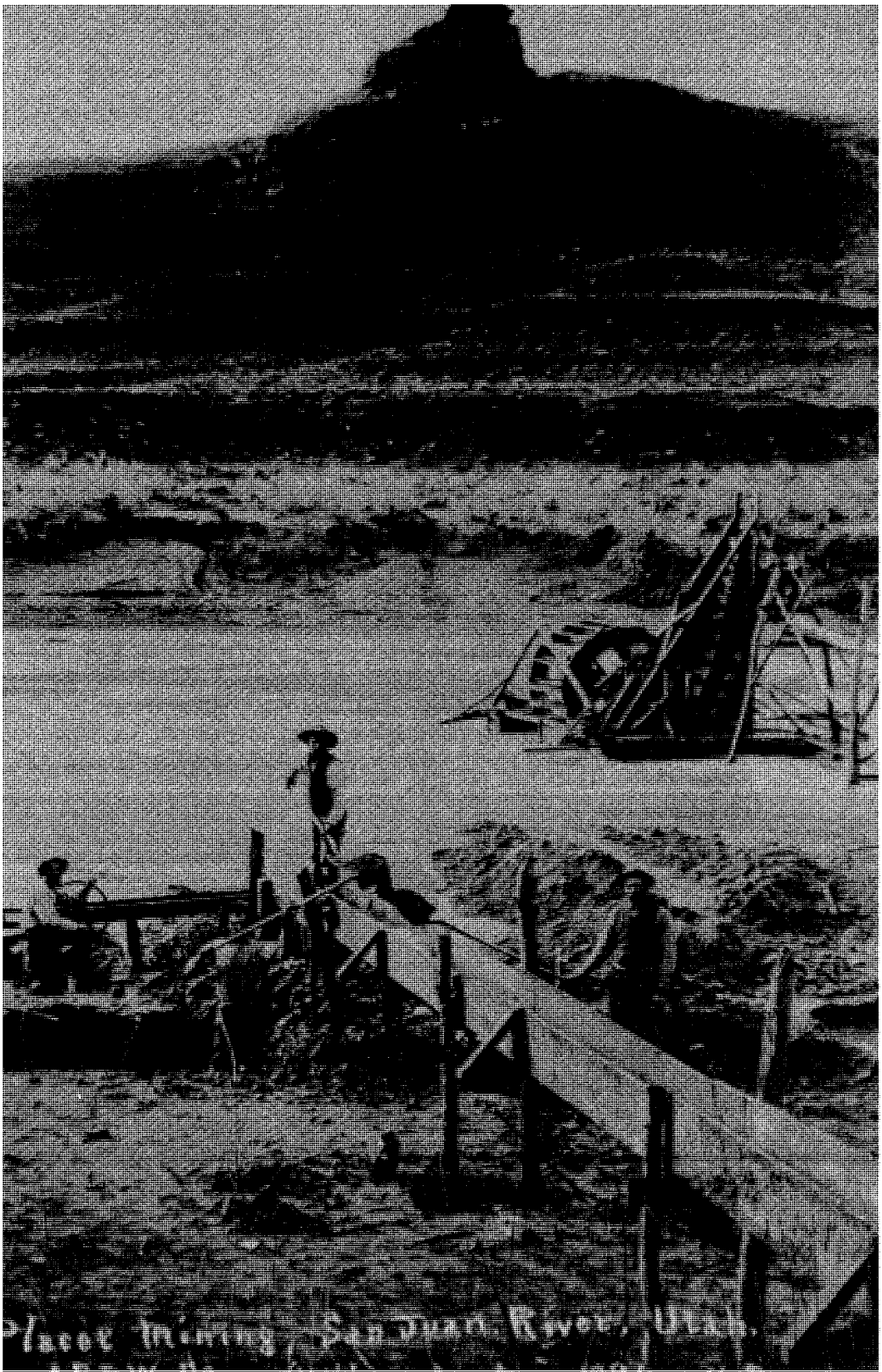
To recover gold, silver, or other minerals, the vein rock had to be crushed. This was done in a variety of ways. At first it was done by hand, and the amount of ore processed was ever so small. The hand mortar and pestle concept became the model for larger devices capable of increased volume. An early crushing method involved tying a large rock firmly to a pole supported by a crutch made from a forked tree. One man raised the rock, using the mechanical advantage of the lever, while another man kept the ore in a receptacle so the rock on the pole could be dropped time after time to complete the crushing process. This crude method, or one similar, gave way to the arrastra, which became a familiar sight in gold and silver mining districts of New Mexico.

There was no such thing as a standard arrastra. Every craftsman made them differently. Despite a variety of design, they all served the same purpose, and their crushing and amalgamating principles were the same. Basically, an arrastra was a circular pit or container about 2 ft deep, and 10 to 20 ft or more in diameter. The sides and bottom grinding surface were either crude stone, cut or dressed stone, or in rare cases, fitted wood. Grinding was accomplished by rigging a boom to a revolving pole set in the center of the arrastra, then attaching a heavy rock, usually 400 to 500 pounds, to one end of the boom, and a mule to the other. As the mule walked around the outside of the arrastra, the rock (or rocks) were dragged across the floor of the machine, thus crushing the ore. To "charge" the arrastra, ore was crushed by hand to the size of pigeon eggs and placed in the pit. After a few hours of working, water, then mercury were added to form a paste. This paste was later thinned with water, and the mud was run off. The gold or silver sank to the bottom of the arrastra with the mercury, as amalgam (an alloy of mercury with another metal or metals). After a number of charges, a clean-up recovered the accumulated amalgam. The amalgam was then processed in a retort if the metal was free-milling (that is, in its native state), or the amalgam was treated further if the ore was "rebellious," or in combination with other substances.

This simple, inexpensive method had great appeal in early New Mexico mining history. While slow, it gave recovery of a good percentage of assay value, cost next to nothing to erect, and the grinding and amalgamating were highly effective. The arrastra is still in use in small operations in Mexico today.

The Chilean mill developed from the arrastra and involved a similar principle. Built the same way, its only difference was that large stone grinding wheels, sometimes made of iron, replaced the dragging stone. More a grinding instrument than a grinder and amalgamator, the Chilean mill was frequently used to pre-grind ores for the arrastra.

It was not long before the eager and impatient miner found that the capacity of both the arrastra and the Chilean mill was insufficient for the volume of ore he wanted to process, and he looked to some of the crushing machines used in Europe and in other parts of the United States to increase his capacity. The advent of better transportation aided him in his quest. The machine he turned to was the stamp mill. The early version, the lumbering German stamp, had wooden stems, weak heads or pestles, and very little capacity. Cornish miners improved on the German models by using iron stems and improved crushing heads. The Californians brought the stamp into its own with the California stamp, which



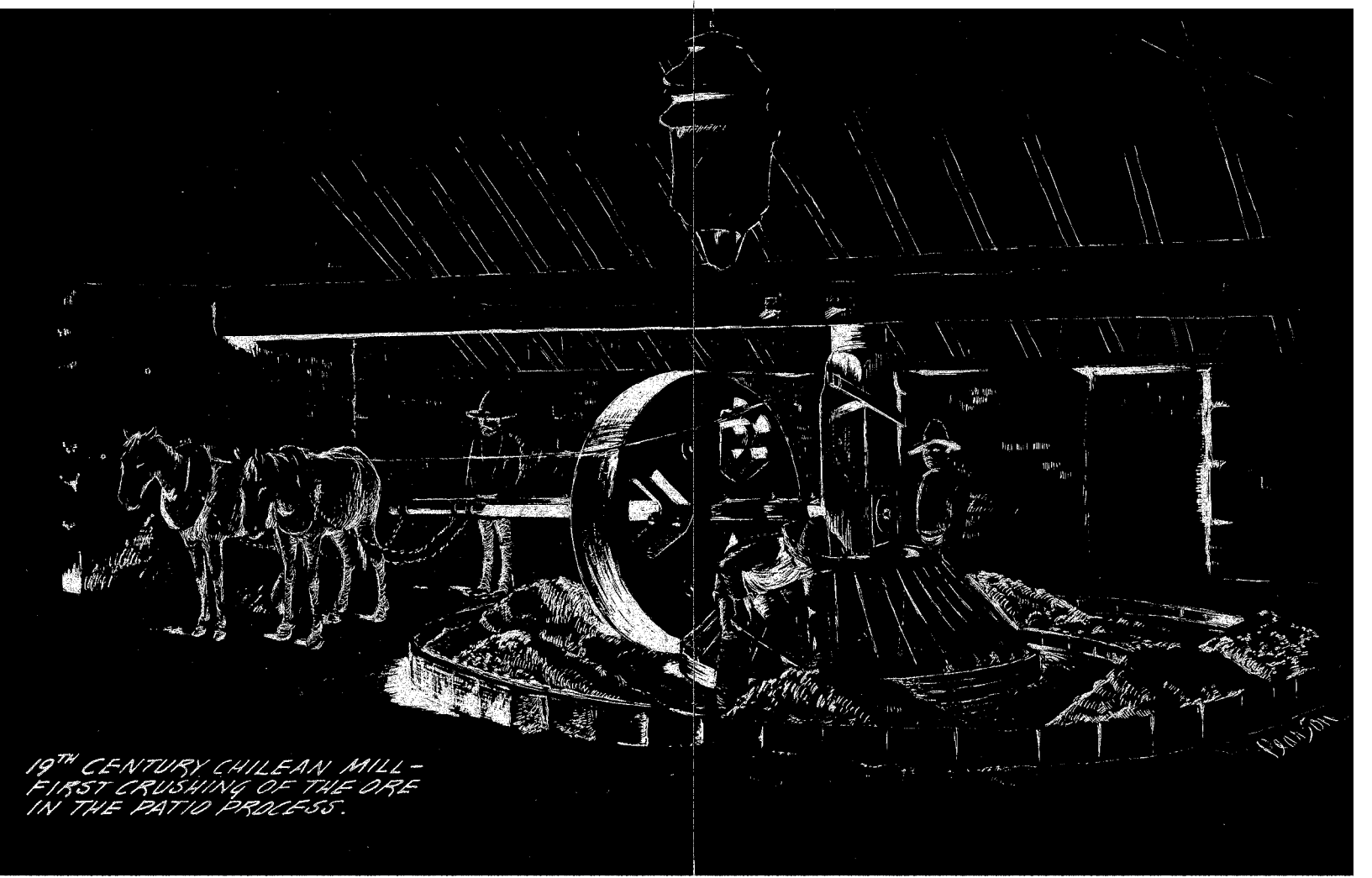
used a rotating shaft and system of cams to lift and drop the heavy iron pestles, weighing up to 350 pounds apiece, to crush the ore. Built in batteries of 5, the stamp could crush from 1½ to 3 tons of rock (depending on the hardness of the ore), in a 24-hour period. The crushed ores were then treated for the various minerals sought. The California stamp appeared throughout New Mexico during the 1870's and 1880's. It was not unusual for some stamp mills to have as many as 60 stamps in operation, and vast amounts of ore were crushed by this device. Even with improved transportation and technology, the California stamps did not give way to more modern methods, except in the larger, richer mines.

Once the ores were crushed, further processing was frequently necessary. If the ores were free-milling, the processes were relatively simple. They were either washed with water to remove the gangue (waste materials), or mercury was used to recover the precious metals. If, however, the sought-after metal or metals were locked in chemical combination with other materials, then other steps were necessary to further reduce the ores. Again, so many processes were involved that it would be tedious to discuss them all. Several techniques stand out as landmarks in the history of metallurgy.

The patio process was the most famous historic metallurgical procedure utilized in the New World. Although rarely used in New Mexico, it was frequently discussed, and an outline of its simple principles will provide a clearer understanding of more advanced processes. Numerous trials indicated that silver ores, with the exception of argentiferous galenas (high-quality lead ores with varying amounts of silver), seldom lent themselves to mechanical concentration and had to be chemically treated. Early in the 16th century, a process was developed which, although slow, was able to separate silver from complex ores. The process was named for the large (several hundred yards square) working area (patio) surrounded by storage houses. The patio, made of carefully fitted stones held in place with mortar or other suitable material to make it (as far as possible) impervious to mercury, could accommodate any number of separate piles or "tortas" to be worked. Materials necessary for the reduction of silver ores by this process were magistral, common salt, and mercury. Magistral (the "trigger," or catalyst), manufactured from copper-iron pyrites, gave the process copper-iron sulfate; the salt supplied chloride. Mercury combined readily with the silver and ultimately extracted it from the ore.

Finely ground silver ores were brought from the arrastras to the patio as slime or thin mud, and placed in one of the areas enclosed by a low wall that kept the slime from spreading out too thinly. Enough mud was added to bring the depth to about a foot. After a few days' exposure to air and sun, the ore thickened and was spaded into piles, ready to work. At this stage, salt was added to the pile, or torta, and the mixture was treaded by horses or mules to make a homogeneous mixture. The magistral was added, and again the mixing process was carried out. Finally, the mercury was added and the mixing continued. The reaction in the torta was a complicated chemical process. In brief, the copper sulfate combined with the salt to form copper chloride, the copper chloride combined with the silver in the ores to form silver chloride, and the mercury combined with the silver chloride to form the amalgam, or alloy, of mercury and silver. The amalgam was washed for impurities and then retorted, producing metallic silver and mercury.

The patio process was not very efficient. Silver losses ranged from 10 to 40 percent, depending on the type of ore. The chemical processes were never really known, even in the late 19th century. Regardless, it was an important breakthrough in metallurgy and was, in great measure, responsible for the vast



19TH CENTURY CHILEAN MILL - FIRST CRUSHING OF THE ORE IN THE PATIO PROCESS.

amounts of silver produced in North and South America between 1550 and 1900.

Another important process utilized a homemade furnace. Heat treatment of ores was an ancient art, used on a great variety of minerals. It was relatively simple and inexpensive to build a stone or adobe furnace, and the design of these showed great variety; some were single chambered, some double. The hearth had a groove, or series of grooves, which allowed the molten metal to collect in a depression in the front of the hearth, where it was recovered. These furnaces were used for the direct reduction of some ores, such as galena to metallic lead, or to concentrate native coppers from the gangue. Sometimes they were used to roast other ores to drive off the sulfur in some silver ores prior to amalgamation; in addition, they were used to manufacture the magistral for the patio process. In short, they were simple, inefficient roasters and smelters, the forerunners of the great smelters that were built across the Southwest after 1880. Fuels varied greatly. In New Mexico, piñon or piñon charcoal was a favorite fuel. Frequently, green woods were used. Sometimes, manure from horses or other livestock was added to the fuel. In single chamber ovens, the fuel and ore were mixed in the proper proportion and the oven fired. In other ovens, the fire heated a second chamber containing the ore. In either case, heat promoted the reduction of the ore to the desired state. The use of fire in the reduction of ores was the dominant method of smelting in New Mexico. Either the technique of the patio process was unknown through most of New Mexico's history, or some of the materials necessary for the process were not available. However, every silver camp, copper camp, lead camp, and many of the gold regions had small smelting furnaces.

After 1880, change came quickly in terms of the technology applied to mining and ore reduction in New Mexico. More equipment of all kinds flowed in via the ever-expanding rail system. Mines tended to become larger; for they were controlled by companies able to exploit more capital, and thereby in a position to take advantage of the increased availability of machinery. Smelters, with expanding capabilities to process the various and complex ores being discovered, reduced the amount of ore-handling at the mine site and made obsolete the primitive furnaces and tools for bullion production. Cheap transportation did the same. The handling of ores, once free from the earth, and the reduction of those ores, became separated from the miner. Many of the old tools which played an important role in early mining history gave way to the new technology. The new ways were less romantic, less individualistic, and to the lonely miner, less satisfying—but ever so much more productive. The transition between 1880 and 1900 was gradual but insistent, and by the turn of the century, Emerson's fateful prophecy, "things are in the saddle and ride mankind," had come to pass, at least as far as mining was concerned.

Transportation underwent dramatic changes in New Mexico as mining gained importance in the territory after the Civil War. Not due to railroads in this case, for that is a separate and distinct story with its origins in national forces far from New Mexico. It is in the building of roads and trails and tramlines, stagecoaches and freight wagons, that the story of emerging capability for the movement of goods and people within New Mexico is told.

The pastoral nature of New Mexico prior to the Civil War, which spanned the Spanish, Mexican, and American periods to that time, did not require an extensive network of roads. The few main trails for importing goods, such as the Santa Fe Trail from Missouri and the Camino Real from Chihuahua, with the few rutted connecting trails, were sufficient. It was a slow life, largely self-sufficient; truly the land of "mañana." But mining changed that. The ores being extracted had no value at all at the mine site. Whether raw ore, concentrate, or

bullion, their markets were far from the canyon, mesa, or mountain vastness. And the ores could not walk out, like the sheep, goats, or cattle. Roads were needed; roads that could handle heavily laden ore wagons, freight wagons hauling in the needed tools, food supplies, and whisky; roads for stagecoaches to bring in people—and more important—mail from home and newspapers from east or west coasts; or from Santa Fe. There was no paternalistic governmental agency to turn to, no state highway department, no United States Department of Public Roads, only the miners' needs, capital, and labor. Every mining camp that developed in New Mexico was quickly connected into the growing system of roads and trails across the deserts and mountains of the territory. The roads crossed over, went through, and went around some of the most terrifying country in New Mexico; and some of the most beautiful. Miners did not choose the locations of their camps—nature did that in ages past, when the ore bodies were laid down or outcrops eroded away, leaving gold in ancient stream beds. The roads had to be built to the mining camps, no matter how difficult the terrain. By the time the railroads came, a system of connecting roads was already emerging, and needed only minor adjustments to connect into this new network.

Many of the roads hacked out of the mountains and deserts of New Mexico to serve the mines during the 19th century still serve us today. In some cases they have been regraded, paved, and drained, and instead of creeping along at a snail's pace with danger at every turn, we now navigate them at 60 to 70 miles per hour—with danger at every turn. A few of the old roads are still there, much the same as they were 100 years ago; via these roads, those with steady nerves can still visit 19th-century mines.

The mining history of New Mexico to 1900 cannot be told without reference to capital acquisition, mine speculation and fraud. Minerals, down through history, have held a great attraction for man: They present the lure of quick wealth, opulence and power. Every mining area anywhere in the world has eventually attracted the speculator, the hustler, and the thief. New Mexico was no different—perhaps it was worse—for unlike California or Colorado, her early mineral wealth was not great. Her ballyhoo and promotion, essential for success, were superb: The myth of great wealth, growing out of Spanish and Mexican legends, plus schemes generated in the fertile minds of her promoters, created an excitement among investors that produced more wealth than her gold and silver.

Once the reality of mineral wealth in New Mexico was established by the early gold discoveries at Elizabethtown and Pinos Altos, the copper at Santa Rita and Hanover, and the silver at Chloride Flat and Georgetown, investors around the nation sat up and took notice. The need for capital in New Mexico was intense and optimism soared. The stored capital in New Mexico was meager, and it soon became apparent that if mining was to prosper and develop, it needed outside help. This need led to all sorts of schemes and strategies to attract the needed capital.

The territorial government established a Department of Immigration whose purpose was to make New Mexico attractive to outsiders (including those with money to invest in the mineral industries). The literature distributed by this agency gave glowing (often untrue), exaggerated reports concerning the natural resources of the territory. It was one step in preparing the uninitiated investor for fleecing. The Department of Immigration was a useful agency, however, for it brought people to New Mexico, attracted by land, commercial opportunity, and beauty, as well as mining. As a propaganda agency set up to sell New Mexico (a kind of state Chamber of Commerce) it succeeded fairly well.

Another scheme, carried out by private individuals, was the use of the cor-

poration to raise capital. This was perhaps the most questionable technique—one that cost a lot of people a lot of money—and was racked with fraud and misrepresentation, yet one that brought much-needed capital into New Mexico and laid the foundation for her mining industry. The corporation was just coming of age as a national institution of business organization as New Mexico mining was emerging from darkness. Rules and regulations concerning good practices in terms of stock sales were not well formulated, and there were cases of fraud in many areas of American business. The laxness in this area of corporate finance made it a natural for the raising of capital for both legitimate and questionable mining enterprises alike.

Rather than treat specific cases, naming names and detailing cases that might embarrass some of the important figures in New Mexico mining history, political life, and professional circles, just the method will be laid out. A relatively simple technique, it required some promising mining claims; whether gold, silver, or copper made little difference. It was not hard to find a prospector or two willing to sell out for a few dollars; probably for the value of his assessment hole (usually $100). Four or five claims became a property, and the basis for the formation of a company to exploit the "rich ores." In some cases, the claims were good ones, and ultimately produced some commercial ore; in others, the prospects were poor—sometimes nonexistent. In either case, the next step was to raise some capital for further exploration. A corporation was established, usually with headquarters in an eastern state, frequently New York or one of the New England states, for the best sources of capital were there. Local people in those states were usually involved as incorporators. The owner of the claims in New Mexico received shares in the corporation (frequently a substantial precentage), for his claims. The other incorporators also received shares for services rendered, such as legal fees, professional services, or similar activities.

Up to this point in the operation, the only cash outlay was for the claims themselves, probably not over a few hundred dollars. A majority of the shares in the corporation were held by the incorporators, and the rest of the stock was offered for sale through a prospectus outlining the holdings of the company, assay reports, and general statements regarding mining in New Mexico. Some of the claims made in these published brochures were almost incredible. Mining engineers and geologists lent their names to many of these, as did leading state and national political figures. The stock offered was sold for whatever it would bring. Some companies were able to raise considerable capital depending upon what they had to offer. While many of them proved to be solid investments that brought substantial profits to the investors, most of them never produced a thing. The capital raised, whether it was a few hundred or many thousands of dollars, was used for exploration of useless properties. It went into barren shafts, roads to nowhere, stamp mills that remained unused, and mines that produced no commercial ores.

Most of these companies were small, but they were numerous, and millions of dollars were spent in this fruitless development. In most cases the money was spent in the honest expectation of positive results. Although most promoters were hopeful, optimistic, and basically honest, there was too much speculation, too much hope, and not enough knowledge of mining and geology for success. One prominent figure, who shall remain nameless, was involved in at least 40 such companies, all incorporated in New York, not one of which ever produced any commercial ore.

A few of the numerous companies formed were out-and-out schemes for embezzlement. They had only fantasy for claims, and the founders and

promoters pocketed all the proceeds from the sale of stock. Fortunately these companies were in the minority.

What was the result of all this investment, speculation, and effort? For New Mexico, it meant a great deal. Although most of the shafts dug were unproductive of minerals, they were dug by New Mexico labor and provided a source of jobs and day wages for many. Those prospects that did become mines provided jobs for people, and were the basis of towns and all that implied business activity. The influx of capital added a new dimension to the economic growth of the territory. No longer just a quiet, pastoral setting, it would now have the bustle of mining activity, whether productive of minerals or not.

An important element in the mining history of New Mexico, or any other mining area or epoch of the past, was the human labor expended to mine the ore, and the conditions under which that labor was performed. Just about every condition of labor existed at one time or another in New Mexico—slave and free, paid and unpaid. The Indian miner worked, but his society had no wage system as such. He labored for himself, for his group, or for his religion; not for wages, not even for glory or prestige; but for the well-being of the society and for survival. Slavery existed in the Indian world, though probably not in New Mexico. The Spanish brought a well-established wage and tribute system with them, which included slavery, forms of personal service in lieu of material tribute, and wages for work performed. Slavery was a simple system, and a cruel one: one human being owned another; not a man-to-man relationship, but rather, man-to-property. The Spanish system recognized slavery, and Indians from the New World and Negroes from Africa came under this system. Fortunately for the Indians, the Church resisted the enslavement of all Indians, and only those seriously resisting Spanish control were brought to this condition. There is some evidence that Indian slaves were used in the few early Spanish mining efforts in New Mexico, particularly in the Cerrillos area.

More important to the Spanish system, however, was the *encomienda,* which was forced labor without wages, in lieu of tribute. The system was applied only to the Indians. Every able-bodied Indian, man, woman, and child, was required to give a certain amount of time in personal service—as personal servants, agricultural laborers, shepherds, or miners; although in New Mexico, labor for mining was minor and never demanded much of the Indians. By the late colonial period, when mining emerged as a significant factor, the encomienda system had been abandoned in favor of a wage system—not a great improvement for Indian or Spanish miners, for the system was based on debt peonage. Wages were low and mine owners or operators supplied all the needs of the miner, leaving him in perpetual debt. Under Spanish, and later, Mexican law, a debtor was required to remain in the employ of his creditor until his debt was paid. Again, a cruel system. Fortunately, while these systems were generally applied throughout the mines of Mexico, New Mexico found itself in a different situation. The economy that evolved in the province, mining included, did not require a large labor force. Much of the effort was of an individual nature: farmers working the land to support their families, shepherds tending flock, or individuals working small mineral deposits. Only at Mina del Tiro and Santa Rita did one find conditions where any substantial quantity of wage labor was used. Wages at these mines were tragically low—probably below subsistence levels—and the wage miner had a sorry lot indeed.

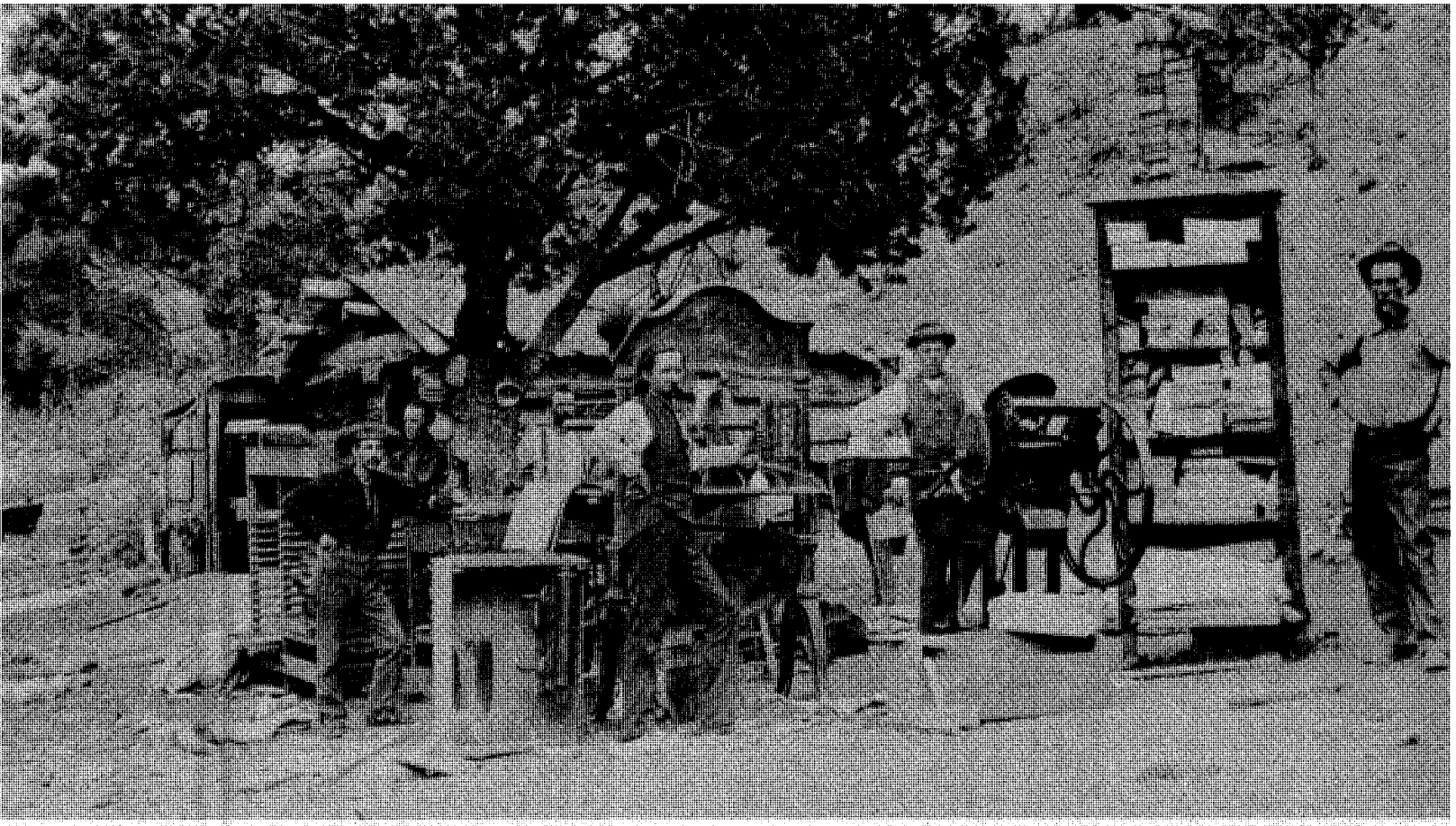
With the end of the colonial regime after 1820, followed shortly by the first gold strikes in the Cerrillos area, the number of wage laborers in the mining industry increased steadily. In fact, from that time on to the end of the century,

the earnings of free-wage miners became an increasingly important factor in the economy of New Mexico. Slavery had virtually disappeared by the time Mexico emerged as a nation, and debt peonage gradually disappeared. By the time the United States acquired New Mexico, free-wage labor was the general pattern, although there were numerous exceptions in outlying areas.

The wage earned by miners varied so greatly that generalization is impossible. Many factors decided an individual's wage—his experience, his productivity, unfortunately, his ethnic background (American miners were paid more than Mexican miners), and the locality of the mine. Reports of wages ranged from "two buckets of gravel per day" for miners in the Cerrillos placer fields in the 1830's (worth about 15¢), to $5.00 per day for experienced miners in the 1890's. By-and-large, miners in New Mexico earned wages comparable to similar labor in other parts of the United States. Neither rich nor poor, they managed to support their families; or a good drunk on Saturday night, whichever was most important.

Prior to 1900, taxes or assessments paid to the state by the New Mexico miners did not amount to much. During the Spanish period, subsurface mineral rights were retained by the state, but private exploitation was encouraged in the tradition of the Germanic mining freedom. The state required the payment of the "Quinto," or royal fifth, of all minerals mined. Mining in New Mexico was never important enough to produce much revenue, and because the colony was so far out on the frontier that collection was impossible, the miners managed to avoid what payment might have been due. The Mexican government never exercised enough control over New Mexico to force tax collection, therefore the miners, still few in number, did not have to worry much about taxes. After American occupation in 1846, and to the end of the century, little changed. The primary source of government revenue, both at territorial and local levels, was property tax. Mining claims and mines were rarely listed on the tax rolls as property. Larger mines which produced for long periods were taxed, but there were precious few of these. Once mining property was patented, some tax benefits were realized. As a stimulant to mining, even after the territorial legislature recognized the tax potential of mining interests, mining claims and mines were exempt from property taxes under territorial law for a varying number of years. Corporation taxes, severance taxes, and other similar taxes designated to tax the mining industry were not implemented until the 20th century. Thus, mining supplied only minor tax benefits to various levels of government in New Mexico during the 19th century.

One of the more interesting facets of life in the Far West was the development of mining camp newspapers. Almost every significant camp in New Mexico had at least one paper, some had several. They lived short and uncertain lives, as did the camps they served. Their news was primarily local, although they printed items copied from eastern papers received in the mail, often several months old. They bolstered the spirit of the camps by reporting new mines, production figures, prospects, and progress of underground works. Seemingly, these figures should be highly valued by historians, but such is not usually the case. The local editors perpetuated rumors, exaggerated production and prospects to make the camp more attractive to people and investors, and were careless of facts. Yet they carried the flair and excitement of the camp; they recorded happy, opulent days and sad ones; and in this sense, they reflect the human side of mining. Their editors were outspoken men, active in community affairs, with rigid political beliefs which they flaunted in their editorials. These back-country mining camp papers are a long-lost part of the American free press.



J. C. Burge photo, Photo Collection, Museum of New Mexico

First Daily Newspaper, Kingston, New Mexico, 1896. How could the press be freer than this?

Life in the mining camps of New Mexico can be idealized as a rugged, individualistic life, showing men wrestling with nature; unafraid of physical labor; building a society in the raw wilderness. It can be done this way, and it has been, but this was not a true picture. Life in the mining camp was tedious: extreme physical labor filled the days from dawn to dark. The miners returned, not to homes and families, but to hovels clinging to the sides of the canyons. They were hot in summer and cold in winter. Families rarely accompanied the miners into the wilderness camps. Food was plain, luxury rare, and good times and good fellowship only occasional. It was a lonely and colorless life. The miners had no great love of the camp, either; and when a camp died, there were few to mourn her. Hope and optimism were the lifeblood of the camp, and when those died, so died the camp.

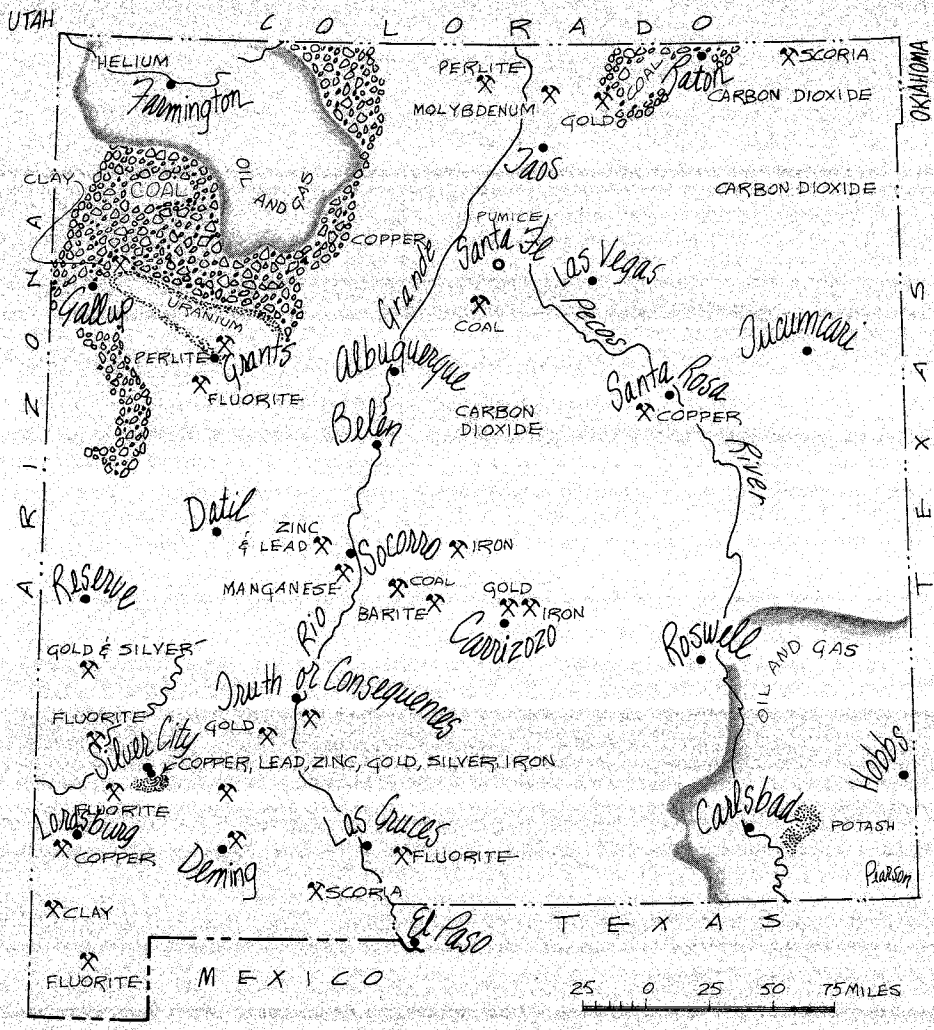
Epilogue

The collapse of silver prices in 1893 and the national financial crisis and depression that followed triggered a decline in mining all over the country, including New Mexico. With a resurgence in the decade preceding World War I, mining in New Mexico took on a different nature. The final 20 years of the 19th century were glorious, romantic, reckless years in the mining camps. It was the era of individual miners pitting their skill against fickle nature, of reckless speculation, small companies, and small boom camps. After 1900, mining in New Mexico entered its industrial age, and one must acknowledge such things as capital, corporations, open-pit operations, water rights, and industrial relations. It was a different time and a different story. Legends and myths have no role then, nor romance, nor tall mining tales in the general store and around the campfire—these were left behind as the 19th century closed.

The gradual shift in interest from precious metals to minerals such as zinc, low-grade copper ores, potash, petroleum, molybdenum, and uranium, to feed an industrial America, largely destroyed the romantic age of mining in New Mexico. The big mining company, which controlled vast amounts of capital, aided in the process. But the death of the stark yet romantic mining camp must not overshadow the great gains made by the mining industry of New Mexico as a result of the shift in emphasis. Productivity, not romance, is the measure of success in mining; and productivity in the 20th century leaped ahead at a frantic rate, making New Mexico a major mineral-producing state. The romantic age created local excitement, picturesque ghost towns, and legends, but relatively little production.

Despite its small scale and its problems, mining in the 19th century laid an impressive foundation for New Mexico's economy, supplying a wage base for New Mexicans which, outside of pastoral, clerical, or servile jobs, had never been available before—an important development for an area suffering from chronic poverty. The expansion of mining during the last half of the 19th century was responsible for the economic growth New Mexico enjoyed as the century closed. Banking and capital reserves grew rapidly, allowing increased investment in a variety of New Mexico ventures. Transportation facilities were expanded in response to the needs of the miners. Agriculture was called upon to increase both crop and livestock production to feed the hungry mining camps. Neglected water resources were developed to supply the heavy needs of the mines and smelters, a development that benefited the entire population of the territory, and later the state. With the increasing flow of commerce and increasing population came the growth of cities. Thus, mining played out its significant role in the history of New Mexico during the early formative years: while not large in terms of dollars, it served New Mexico well.

Statistics are sterile, illusive things, subject to the full range of criticism: they seldom convince anyone of anything. Yet production statistics for New Mexico show some startling trends and the reality of change. An educated guess at total mineral production prior to 1900, including Spanish and Mexican mining, would be approximately $110,000,000. Slightly over one-third of that was gold ($11,000,000) and silver ($28,000,000) production. Coal probably had the greatest single value, with nearly $40,000,000. The figures for the 20th century were so great for the major minerals that only the decade from 1960 to 1969 was used for comparison. During that period, the production of copper alone (approximately $225,000,000) was valued at more than double the total production of all mineral products in New Mexico prior to 1900. Including petroleum production during



MINERAL RESOURCES OF NEW MEXICO 1974.

this decade, the total estimated value is over 2.5 billion dollars, and natural gas production was even greater than petroleum. The best decade for gold production was from 1930 to 1939, when the state produced slightly over $10,000,000 in value; the best silver production was 1880 to 1889 when the total was nearly $16,000,000. Total gold production for New Mexico during her entire history has been between $46,000,000 and $50,000,000. Silver production was higher, totaling between $63,000,000 and $65,000,000. The following chart shows some highly select, estimated figures for various periods.

Mineral	*Total prior to 1900*	*Decade of 1960's*
Gold	10 to 12 million dollars	2.4 million dollars
Silver	27 to 30 million dollars	3 million dollars
Coal	10 to 12 million tons	18 million tons
Copper	20 to 22 million pounds	1.5 billion pounds
Lead	70,000 tons	18,000 tons
Petroleum	0	1 billion barrels
Potash	0	23.5 million tons
Uranium	0	25.3 million tons

The figures are clear. New Mexico was not a prime mining area until the 20th century, then the bulk of her production came after World War II. Despite this glaring fact, the people of New Mexico at every historic period have, in their own way, worked the land for its mineral wealth, and each in their way, and at their level, reaped great profit from that effort.

Perhaps, in the final analysis, the fact that New Mexico had limited mineral production in the past—in comparison with other regions—kept alive the myths and legends of great wealth. The fact that the people of New Mexico were ofttimes faced with poverty fed the hope that the myths were somehow real; the legends based on facts.

The theme remains consistent: mineral resources and mining are essential elements in the unfolding history of New Mexico. While the legends of the past fade into interesting but questionable items buried in dusty books, new myths and legends spring up on every hand, which are sworn to be true and reveal that Humbolt was right in 1803 when he said, "The wealth of the world will be found in New Mexico. . . ."

Essay on Sources for New Mexico Mining History

Unfortunately, concentrations of historical materials giving the historian or the popular writer an opportunity to quickly gather the story of New Mexico mining are nil. New Mexico prospectors and miners did not leave a written record to document their activities. Only a few company records have survived. To accumulate mining facts and lore, one must consult a vast variety of sources, usually scattered in many places. Bits and pieces can then be woven into something resembling a narrative or story.

Archival sources, usually a solid starting place for historians to work, are relatively unproductive in terms of mining history. County, state, and federal records tell some aspects of the story, but these are sterile and generally quantitative, lacking important aspects of mining, such as prospecting, transportation, and the daily life of the miner. Basic records provide some data, but will not even begin to establish a narrative.

Mining camp newspapers are jam-packed with all kinds of information on mining, mining prospects, hopes, and dreams. The job of the historian is to try to

sift out what is truth and what is not. Frequently no relationship appears between what the historian can determine as accurate circumstances in a given case and what a camp newspaper said. The romance, the color, the excitement, are there in full measure, but great care must be exercised in the use of these remarkable publications as historical documents.

Published government documents relating to mining activity, both state and federal, are numerous. Nineteenth-century documents appearing in these include considerable history, but rarely did the authors and historians utilize objective techniques. Everything the authors dug up, they worked into their narratives, including the wildest rumors, the most outlandish legends, and the most extreme optimism. More modern government publications are prone to ignore historical factors completely in favor of massive statistical accumulation. These have great value in that reliable statistics on production at the local level are practically nonexistent. After the formation of the United States Geological Survey, the Federal Bureau of Mines, and later the New Mexico Bureau of Mines and Mineral Resources, the quality of history included in their technical publications improved dramatically. These agencies used highly trained scientific personnel who looked more closely at the historic processes, even if this was a minor part of their effort.

Reminiscences of old-timers who lived in or near the camps, whether published or just listened to, would seem a valuable source of mining history, and indeed some of them are. But we have too few of these to give us an adequate cross-check on the accuracy of memory—an illusive thing. Similarly, eyewitness accounts, written down at the time, have great value. Again, there are few of these.

No wonder books written about mining in New Mexico are not completely satisfying. There are too many gaps, guesses, misinformation, and lack of documented data to tell the tale as it should be told. The preceding chapters on mining history will be subjected to that same criticism. There have been few, if any, efforts to put together the mining history of New Mexico. The books listed in the following annotated bibliography will attest to that. Nonetheless, considerable information has been assembled by an array of writers that tells parts of the mining story.

The following bibliography represents a select list of books, manuscripts, periodicals, and printed documents relating to the history of New Mexico which were consulted in the preparation of this book. Where a number of similar materials were used, only one deemed typical is listed.

Bibliography and Sources

BOOKS

Abert, J. W., Report of Lieutenant J. W. Abert of his Expedition to New Mexico in the years 1846-1847, 30th Cong., 1st Sess., Ex. Doc. no. 41. Washington, U.S. Govt. Printing Office, 1848. *Contains several important references; an eyewitness account of early New Mexico mining.*

Anderson, A. D., The Silver Country of the Great Southwest: a Review of the Mineral and Other Wealth . . . of the Former Kingdom of New Spain, New York, Putnam Co., 1877. *Contains some guesses at mining production for very early periods, and some glowing hope.*

Arny, W. F. M., Interesting Items Regarding New Mexico, Its Agriculture, Pastoral, and Mineral Resources, People, Climate, Soil, Scenery, Santa Fe, Manderfield and Tucker, 1873. *Arny was "acting" Governor of New Mexico at the time of writing. An example of promotional literature.*

Arrowsmith, Rex, ed., Mines of the Old Southwest; Early Reports on Mines of New Mexico and Arizona by the Explorers Abert and Others, Santa Fe, Stagecoach Press, 1963. *Compilation of some key statements of 19th century writers and travelers in New Mexico and Arizona.*

Ball, Sidney H., The Mining of Gems and Ornamental Stones by American Indians, Bureau of American Ethnology, Bull. 128, Washington, U.S. Govt. Printing Office, 1941. *Includes some discussion of mining by New Mexico Indians.*

Bancroft, Hurgert H., History of Arizona and New Mexico, San Francisco, H. H. Bancroft Co., 1889 (a modern version has been reprinted by Horn-Wallace, Albuquerque). *Scattered references to early Spanish, Mexican, and American mining history.*

Bartlett, John R., Personal Narrative of Exploration and Incidents in Texas, New Mexico, California, Sonora and Chihuahua, Chicago, Rio Grande Press, 1965 (reprint). *Bartlett led the boundary survey team following the Mexican War. Particularly important to New Mexico mining history because of his detailed account of the Santa Rita mines at mid-19th century.*

Brevoort, Elias, New Mexico, Her Natural Resources and Attractions, Santa Fe, n.p., 1874. *A fairly early description of New Mexico including a section "Metals and Mining, Hot Springs, etc." Most of the mining discussion is about Cerrillos; contains material on other districts in production at that time. Interesting little book.*

Chapman, Manville, Blazed Trails, Series of the Colfax County Historical Narratives, Colfax County Historical Society, 1935. *Includes a good description of Blossberg coal mining area and Elizabethtown.*

Chase, C. M., The Editors Run in New Mexico, Fort Davis, Texas, Frontier Books, 1968. *A series of letters written on a trip from the east coast to New Mexico and Colorado in the 1880's. Contains some interesting eyewitness views of New Mexico, including Elizabethtown and Socorro.*

Cleland, Robert G., A History of Phelps-Dodge, 1834-1950, New York, Alfred Knopf, 1952. *Has several references to Phelps-Dodge holdings near Tyrone (Burro Mountains); also some references to rail transportation and its relation to mining in New Mexico.*

Costigan, George P., Handbook on American Mining Law, St. Paul, West Pub. Co., 1908. *Good review of American mining law, including state laws. Discusses English and Spanish precedents. Reflects early 20th-century legal attitudes.*

Egleston, Thomas, The Metallurgy of Silver, Gold, and Mercury in the United States, New York, J. Wiley and Sons, 1887, 2 vols. *A good look at metallurgical techniques in the 19th century.*

Ferguson, Robert, Lost Treasure: the Search for Hidden Gold, New York, Vintage Press, 1957. *One of many books that have contributed toward making treasure hunting a leading American recreational form.*

Ferris, Robert G., Prospectors, Cowhands, and Sodbusters, National Survey of Historic Sites and Buildings, Vol. XI, Washington, U.S. Govt. Printing Office, 1967. *Reviews historic places associated with mining, ranching, and farming in the trans-Mississippi west. Some important mining regions in New Mexico are included.*

Finley, J. R., Report of Appraisal of Mines of New Mexico, State Tax Commission, Santa Fe, n.p., 1922. *Analysis of various mining districts with some production figures (often from Fayette Jones), with location of each district, names of principal mines, current (1922) status of mining in each district, and geologic data for each district. A fairly good source if used with confirming evidence.*

Giles, James S., Mogollon, the Ghost Town that Refused to Die, Anthony, N.M., Valley News, 1970. *Local hearsay and memory, with some mining history. Must be used with care.*

The Gold Mines of the Moreno Valley and the Ute Creek District, Colfax County, New Mexico, Chicago, n.p., 1894. *Published to promote the Santa Fe Railroad and its attractions. Has some excellent early photographs of the mining operations on the Ute Creek side of Baldy Mountain.*

Greever, William S., The Bonanza West; the Story of Western Mining Rushes, 1848-1900, Norman, Univ. Oklahoma Press, 1963. *Contains almost nothing on New Mexico. Obviously, the rushes in New Mexico were not as significant as those in other Western States. Good general information on bonanza mining in California, Nevada, Colorado, Montana, Idaho, and South Dakota. Useful for comparison with New Mexico.*

Hayward, I. Lyman, The Los Cerrillos Mines and Their Mineral Resources, South Framingham, Miss., J. C. Clark Co., 1880. *This rare little book is an interesting early account of the oldest mining district in New Mexico. Contains historical data not available elsewhere. Includes complete text of the Cerrillos district mining code. Copies are available at the Museum of New Mexico and the New Mexico Records and Archives Commission, Santa Fe, and at the Bancroft Library, Berkeley, California.*

Hoover, Herman A., Early days in the Mogollons: tales from the Bloated Goat, El Paso, Western Press, 1958. *Reminiscences of mining and other activities in the Mogollon Mountains of New Mexico during late 19th century.*

Jones, Fayette, New Mexico Mines and Minerals, Santa Fe, New Mexico Printing Co., 1904. *One of the most influential books on New Mexico mining history. Much of the material has been used in many references, leading to some problems. Jones, an ambitious mining engineering consultant, was commissioned by the Territory of New Mexico to author this book, which was used as a promotional giveaway at the World Exposition at St. Louis in 1905. Later the book was used by Jones to promote his own business. While many of the stories and dates seem acceptable, many of his production figures and estimates of the wealth of many undeveloped areas are questionable.*

Long, William, "A History of Mining in New Mexico during the Spanish and Mexican Periods," University of New Mexico Master of Arts Thesis, 1964, unpublished. *Outlines the mining activities of the Spanish and their continuing effort to locate mineral wealth. An adequate study which confirms minor activity in the Spanish period.*

Los Angeles Chamber of Commerce, Arizona Mines, Including Southwestern New Mexico, Los Angeles, n.p., 1947. *One of a series of reports on mines operating in Arizona and southwestern New Mexico. Has some current production figures, ownership, management, and mining methods for each mine. Originally intended as an aid to investors.*

Lovelace, Leland, Lost Mines and Hidden Treasures, San Antonio, Naylor Co., 1956. *One of many books on this subject. New Mexico is represented.*

Marcosson, Isaac, Anaconda, Dodd Meade and Co., New York, 1957. *Contains a brief history of the early phases of the Grants uranium boom.*

McKee, W. H., The Territory of New Mexico and Its Resources, New York, n.p. 1866. *Mining comprises a considerable part of this study. Full of romance, legend and faulty geologic evidence. This book, typical of many items published at the time, caused great excitement about the future of New Mexico mining, and gave credence to legends that preceded and followed.*

Murphey, Lawrence, Boom and Bust on Baldy Mountain, 1864-1964, Tucson, n.p., 1964. Mimeograph publication. *A detailed, well-documented history of mining around Elizabethtown in northern New Mexico. Originally done as a thesis for a master's degree.*

Northrop, Stuart, Minerals of New Mexico, University of New Mexico Bulletins, Geological Series, Vol. 6, no. 1, Albuquerque, Univ. New Mexico Press, 1942. *Although mostly a guide to minerals, this book contains some valuable historical data. Utilizes Fayette Jones to some extent.*

Pearce, T. M., ed., New Mexico Place Names, Albuquerque, Univ. New Mexico Press, 1965. *In establishing and explaining the origin of New Mexico place names, the author includes some interesting mining history.*

Pearson, Jim B., The Maxwell Land Grant, Norman, 1961. *Contains a chapter on Elizabethtown.*

Phillips, J. Arthur, The Mining and Metallurgy of Gold and Silver, London, n.p., 1867. *Excellent descriptions of various methods used by miners and metallurgists of the 1860's. Reflects scientific thinking and engineering principles of the time.*

Raymond, Rossiter, Statistics of Mines and Mining, Washington, U.S. Govt. Printing Office, 1870. *Raymond was United States Commissioner of Mining Statistics. A number of early publications of*

this nature were done by various Federal agencies prior to the founding of the U.S. Geological Survey and, later, the U.S. Bureau of Mines. These early publications have some historical data, but relied heavily on hearsay; frequently the full range of myth, legend, and local optimism were included.

Rickard, Thomas A., A History of American Mining, New York, McGraw Hill, 1932. *A mining engineer by profession, the author was a prolific writer on American mining history. Rickard recorded what he had seen and read on his many mining experiences around the world. He was editor of the* Engineering and Mining Journal, *the* Mining and Scientific Press, *and* Mining Magazine. *This book has several references to early New Mexico mining camps, such as Pinos Altos and Santa Rita, as well as some mention of early Spanish mining. Rickard also authored an excellent and important article on the history of Santa Rita and the Chino Mining Company in the* Engineering and Mining Journal *(vol. 116, November, 1923).*

Shinn, Charles H., Mining Camps: A Study in American Frontier Government, New York, Alfred Knopf, 1948. *The standard work on California mining-camp law and its growth. New Mexico camp law grew out of this California experience, with local Spanish and Mexican additions.*

Sillman, B., The Rio Grande Gold Gravels, Report on the Newly Discovered Auriferous Gravels of the Upper Rio Grande del Norte, in the Counties of Taos and Rio Arriba, New Mexico, Omaha, n.p., 1880. *A copy of this published pamphlet is in the Prince Papers, Mining, New Mexico Records and Archives Commission. Written to promote the Central Placer Gold Mining Company, this book is the most extravagant combination of legend, false impressions, hearsay, and fabrication I encountered in the vast amount of promotional material on New Mexico mining in the 19th century.*

Twitchell, Ralph E., The Leading Facts of New Mexico History, Cedar Rapids, Torch Press, 1911-1913. 3 vols. *Contains scattered references to early Spanish, Mexican, and American mining history.*

———. The Spanish Archives of New Mexico, Cedar Rapids, Torch Press, 1914. 2 vols. *Lists a number of references to mining claims and mining regulations. This collection resides in the New Mexico Records and Archives Commission, Santa Fe.*

Walle, Muriel, The Bonanza Trail: Ghost Towns and Mining Camps of the West, Bloomington, Ind., Indiana Univ. Press, 1953. *Series of vignettes on mining camps. Includes Socorro, Kelly, Old Placers (Dolores), New Placers (and Golden), San Pedro, Elizabethtown, White Oaks, Organ, Gold Dust, Hillsboro, Kingston, Silver City, and Mogollon. The built-in legends and myths make this a questionable historic source. Fun reading, though.*

Watson, Dorothy, The Pinos Altos Story, Silver City, n.p., 1960. *A small book dealing with the Pinos Altos gold camp. Mostly about the people and growth of the town, with a minimum of mining history.*

Willis, W. G., The Lost Mines of Father La Cruz, Las Cruces, Bronson Printing Co., 1939. *Mining history and legend in the Mesilla Valley.*

Wisleyenus, A., Memoir of a Tour to Northern Mexico Connected With Col. Doniphan's Expedition in 1846 and 1847, 30th Cong., 1st. Sess., Senate Misc. Doc. no. 26, Washington, U.S. Govt. Printing Office, 1848. *Attempts to evaluate mining and mineral resources. Very optimistic, repeating many of the myths and legends (without so indicating).*

PERIODICALS AND SERIALS

American Institute of Mining Engineers, Transactions. *From time to time, carries selected items dealing with historic data on New Mexico mining.*

Chino Mines Division of Kennecott Corporation, Chinorama, Hurley, New Mexico. *This company magazine contains a number of articles relating to the history of the Santa Rita mines, as well as mining in the surrounding region. Includes reproductions of old photographs.*

The Engineering and Mining Journal. *Includes a number of articles and weekly news items on New Mexico mining, some with historic data. The reliability of the news might be questioned, however, because frequently it originated in mining camps lacking trained reporters.*

Mining and Scientific Press, commencing with 1860. *Contains both technical articles and news on mining in various areas of the world. New Mexico news was frequently supplied from local correspondents on a regular basis (from Chloride, Mogollon, Socorro, and Silver City), or from letters received from miners or mining companies. The amount of material, along with huge gaps in the record, make the job of culling out information from this publication difficult. Material tends to be local and intermittent. Much of its importance may be attributed to its long run (1860 to present). Each volume is indexed, but the series lacks a general index.*

New Mexico Bureau of Immigration, Santa Fe, New Mexico. *The various publications of this state agency, now all out-of-print, comprise a good source for the kind of "ballyhoo" that gushed from New Mexico in the late 19th century. In some rare instances, these pamphlets give acceptable historic data.*

New Mexico Bureau of Mines and Mineral Resources, Bulletins and Circulars, Socorro, commencing in 1915. *Although primarily technical in nature, and written by mining engineers, geologists, and other technically oriented people, many of these reports contain valuable historical accounts and materials. The quality and quantity of the history varies with historical interest of the writer.*

New Mexico Magazine. *For many years the popular and leading promotional magazine for the state of New Mexico. Contains a number of items relating to mining and mining history, myth, and legend.*

Silver City Chamber of Commerce, Silver City, New Mexico, Mimeograph publications. *The Silver City Chamber of Commerce has produced a number of short publications on various mining centers or episodes on Grant County mining history.*

U.S. Bureau of Mines, Bulletins, Circulars, and Reports of Investigations. *Contain many articles and special studies on various mines and mining regions in New Mexico. Frequently have hard-to-get historic data.*

U.S. Bureau of Mines, Mineral Resources Yearbook, commencing in 1882. *First appeared as a publication of the U.S. Geological Survey; later, the U.S. Bureau of Mines. Contains valuable statistics. Frequently has articles with historical information. Older volumes have more information on history than current issues.*

U.S. Geological Survey. *Many of the publications of the U.S.G.S. contain some mining history, although their primary content is geology.*

U.S. Treasury Department, Reports on Western Mining, Washington, U.S. Govt. Printing Office, commencing 1854. *Various titles. Some reports contain detailed narratives of historical development; others are statistical. Lists operating companies. Most of the coverage concerns precious metals.*

PERIODICALS CONTAINING OCCASIONAL DATA

Journals and Magazines

Mineral Age
Mines and Minerals
Mines Magazine
Mining and Contracting Review
Mining Congress Journal
The Mining World
The Mining Record

Newspapers

Chronicle-News, Trinidad, Colorado
Cimarron News and Press, Cimarron, New Mexico
The Daily New Mexican, Santa Fe, New Mexico
Las Vegas Daily Optic, Las Vegas, New Mexico
New Mexico Miner, Elizabethtown, New Mexico
Santa Fe New Mexican, Santa Fe, New Mexico
Santa Fe Weekly Gazette, Santa Fe, New Mexico
Silver City Enterprise, Silver City, New Mexico
Socorro Chieftain, Socorro, New Mexico

MANUSCRIPT AND ARCHIVAL SOURCES

Bradford Prince paper, Mining, New Mexico Records and Archives Commission, Santa Fe, New Mexico. *Governor of New Mexico and a leading lawyer in the territory and state, Prince (like everyone else) was interested in mining. He was in contact with many people in various mining centers as well as with sources of capital. His papers, although spotty in detail, are valuable to the mining history of New Mexico.*

Fayette Jones Papers, Speare Library, New Mexico Institute of Mining and Technology, Socorro,

New Mexico. *Fayette Jones, a mining consultant, writer of New Mexico mining history, and twice president of New Mexico School of Mines, preserved his private and business papers spanning the years 1892 to 1940. These papers, now in the Speare Library, provide good insight into some of the problems of mining in New Mexico, and the role of the mining engineer.*

H. H. Bancroft Collection, Bancroft Library, University of California, Berkeley, California. *Bancroft collected a mass of material, both manuscript and transcribed oral interviews, from New Mexico residents in the 19th century. This material, part of the collection he used in preparing his massive study of the Pacific States of North America, contains many scattered references to New Mexico mining and mineral resources.*

Maxwell Land Grant Company Papers, Special Collections Library, Zimmerman Library, University of New Mexico, Albuquerque, New Mexico. *This company acquired the holdings of the Maxwell Land Grant in the late 19th century. Includes some papers relating to the Aztec mine on Baldy Mountain and its production in the late 19th and early 20th centuries. Also includes isolated references to early mining around Elizabethtown, and old photographs.*

Mining Papers, New Mexico Records Center and Archives Commission, Santa Fe, New Mexico. *A number of interesting documents relating to various companies and people appear in these general papers. The material is spotty, but has good references to capital acquisition methods.*

Renehan-Gilbert Papers, section on "mining," New Mexico Records and Archives Commission, Santa Fe. *Manuscript materials relating to mining activities around Santa Fe and in the Cerrillos area in the late 19th century.*

Thomas Catron Papers, Special Collections Library, Zimmerman Library, University of New Mexico, Albuquerque, New Mexico. *Thomas Catron, lawyer and U.S. Senator from New Mexico, like other leaders of his time, had an interest in mining.*

Index

Gold and silver mines were a reality. The prospectors had located what were described as fabulous ore bodies; speculators were touting New Mexico as the richest mining area in the United States, and foreign and domestic investors began to respond as gold and silver bullion began to flow out of New Mexico in the late 1870's, ushering in the most romantic, the most exciting, the most lawless, and certainly the wildest period in the history of mining in New Mexico. The mining boom also brought modern transportation, roads, smelters, businesses, ranches, and agriculture. When the excitement of mining subsided, life also slowed; but many of the camps survived and settled into a stable—though smaller—scale of living. But some of them died—ghost towns like Kelly, Mogollon, and Chloride are mute testimony to the glory of central New Mexico in the last two decades of the 19th century.