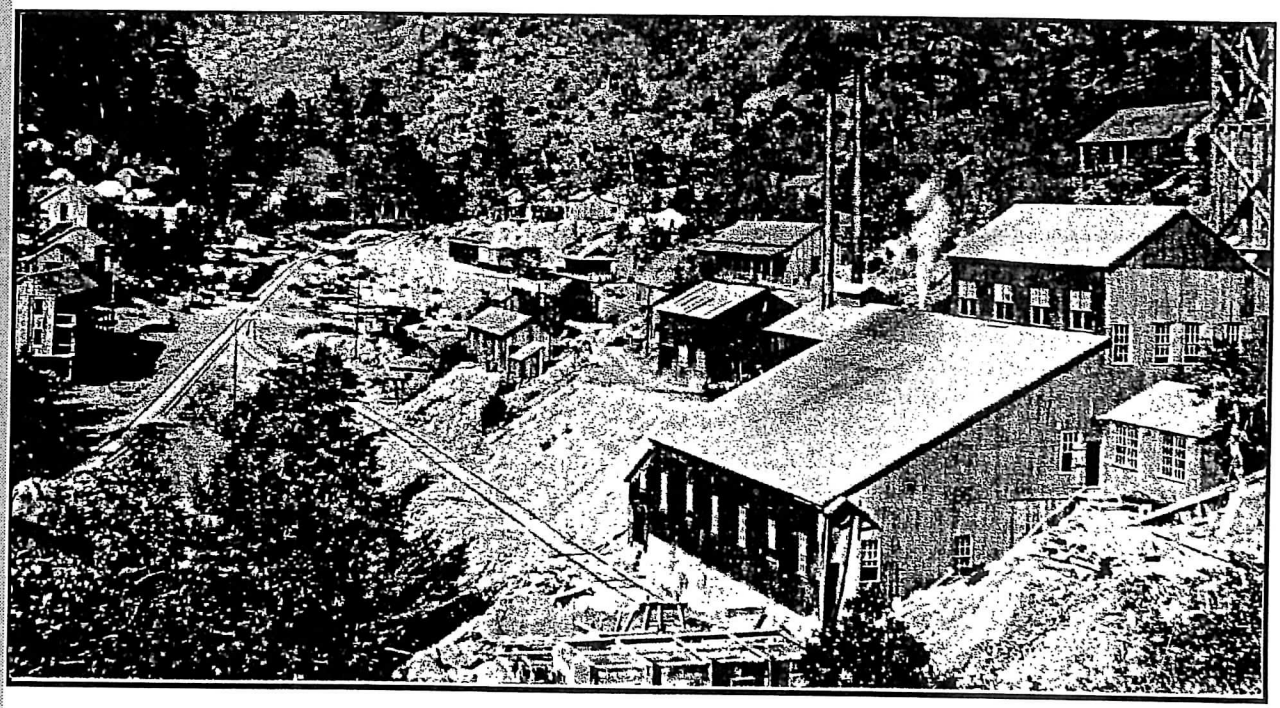
GOLD & SILVER MINING IN ARIZONA 1848-1945



A Component of the Arizona Historic Preservation Plan

prepared for:
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Arizona State Parks Board
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December, 1992

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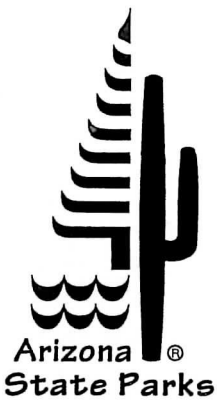

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GOLD AND SILVER MINING IN ARIZONA, 1848-1945

A CONTEXT FOR HISTORIC PRESERVATION PLANNING

Prepared for

State Historic Preservation Office
Arizona State Parks
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PREFACE

This succinct overview of the significance of gold and silver mining through the history of Arizona is intended to serve as a context for planning the preservation of historic properties related to gold and silver mining in the state. A historic context can be understood as a road map that delineates past research and maps out future preservation activities. This context was prepared under the terms of a contract from the State Historic Preservation Office; the terms of that contract specified the scope and format of this document. The effort was intended to produce an initial "map" of only the major highways--not a detailed atlas of every road and byway. A thorough history of the evolution of gold and silver mining and refining technology in Arizona remains to be written, and although the documentary and folklore histories of precious metals mining in Arizona are extensive, there is much work to be done to correlate the rich history with particular gold and silver mining properties.

The first chapter begins with a summation of the significance of precious metals mining to Arizona, and then recounts the history of gold and silver mining, pointing out landmarks along the way such as the international, national and regional trends that had an effect on the industry, and the technological developments in mining and refining that have taken place over the last 150 years. The second chapter describes the inventoried property types in Arizona that have been associated with gold and silver mining, and discusses a strategy for evaluating significance of such properties as they are identified in future inventories. The third and last chapter sets forth several issues, or challenges, in the preservation of gold and silver mining sites, and suggests strategies to deal with them.

To maintain the brevity of this document, a great deal of information has been encapsulated within five appendices. The first appendix is a glossary of terms common to the historic gold and silver mining industry, and is intended as an aid to understanding what can be a bewildering jargon to the uninitiated. Appendix 2 sketches the known contributions of cultural and ethnic groups in Arizona to the historic gold and silver mining industry; although the listing is undoubtedly incomplete, it gives an indication of the wide variety of groups involved. Appendix 3 is a short "Who's Who" in Arizona gold and silver mining, listing individual contributors to the industry. These biographical sketches give a glimpse into the fabric of history, because many of the individuals who came to Arizona seeking their fortunes had earlier trapped beaver, fought in the Texas Revolution, served in the Mexican War, tried their hand in the California Gold Rush, or promoted the Arizona Territory. Any historic properties associated with these individuals could be candidates for the National Register of Historic Places.

The fourth appendix reproduces the map and index of Arizona mining districts first produced by the Arizona Bureau of Mines in 1961. Used together, the map and index are an indispensable tool for identifying and locating the 246 historic mining districts

in the state. A wall-size copy of this map and index is available from the Arizona Department of Mines and Mineral Resources for a nominal fee and is a must for the devotee of mining history. Appendix 5 lists the mining properties identified in the State Historic Preservation Office historic inventory. Rather than being a list of all significant properties in the state, it is a listing of those properties that have been examined and reported to the State Historic Preservation Office.

We hope the information in this context will enable historic preservationists, professional cultural resource managers, and interested lay people to more readily identify and evaluate historic gold and silver mining properties. The measure of our success will be whether significant historic gold and silver mining properties are identified in the coming years, and managed as a truly significant aspect of Arizona's heritage.

CHAPTER 1
THE HISTORY OF GOLD AND SILVER MINING IN ARIZONA, 1848-1945

The gold and silver hidden in Arizona has had a tremendous impact on the history of the state. The lure of gold brought some of the first Europeans and Americans to Arizona; a legendary silver find named the state. The state seal incorporates a miner with a pick and shovel; the state motto, "Ditat Deus" (God Enriches) refers to the mineral wealth of the area. Governor Goodwin's opening address to the first Territorial Legislature in September 1864 described the riches.

> The most extensive and important interest of this territory is the mineral wealth. Whole chains of mountains are seamed with veins of gold and silver. And the gold and copper mines of the Colorado and Hassayampa are only surpassed in richness by the silver mines of southern Arizona (Greeley 1987:21)

A few numbers calibrate the importance of the mining industry as a whole in Arizona. More than 400,000 mining claims have been recorded in Arizona since the mid-nineteenth century, and more than 4,000 mining companies have been formed in the state. During the last 150 years, more than 246 historic mining districts have been established to govern claim locations in boom town mining communities. During the half century from 1860 to 1910, Arizona produced over $600 million of gold, silver, lead, and copper (Karpiscak and Wright 1991: 101-103).

How many of those mining claims claimed gold strikes? How many of those mining companies mined silver? Answers to these and similar questions about Arizona's mining history are not easily answered because of the polymetallic nature of Arizona's ores. Arizona, along with most of Nevada and parts of California and Utah, lies in the intermountain region of gold, silver, and copper deposits (Figure 1-1). The significant gold and silver deposits of Arizona are found in a broad band stretching across the state diagonally from southeast to northwest (Figure 1-2). These "metallic ores" contain other metals in addition to gold or silver, and thus a single mine in Arizona may produce silver *and* gold, as well as copper, lead, zinc and molybdenum. A mine initially opened to exploit silver ores and famous as a "silver bonanza" may eventually produce far more copper or lead than silver. Only a very few mines have produced a single metal (Beck and Haase 1989;68; Hecht and Reeves 1981:53; Keith and others 1983:16-55).

IMPACTS OF GOLD AND SILVER MINING ON ARIZONA

The impacts of gold and silver mining on the history of Arizona have been both significant and serendipitous. Gold and silver fever brought miners, merchants, and money to Arizona. Major historic gold and silver mines operated across the central and southern portions of Arizona (Figure 1-3). Many place names across the state originated with gold and silver miners; the word "Arizona" itself came from a early silver strike.

Historical Overview

When southern Arizona was known as part of the Pímeria Alta of northern New Spain, Spanish explorers prospected the area, striking silver at Arizonac and mining gold at Guevavi. Spanish and later Mexican mining efforts in southern Arizona were short-lived and unsuccessful.

The first few Americans to travel through Arizona hunted beaver along the Gila, Salt, and Verde Rivers in 1826. More came through Arizona in 1846 on their way to fight in the Mexican War in California, and in 1848 to prospect for gold in the California Gold Rush; few stopped to look around. It was only after the waning of the gold fever in California that miners came *east* to prospect in Arizona. Prospectors first found placer gold along the Colorado River, then the Gila River, then along Lynx Creek and Rich Hill. They discovered lode gold close to the surface, baptizing their finds with colorful names such as the Vulture Mine, and the King of Arizona Mine. They found silver in Tombstone and Crown King. Boom town followed boom town as the itinerant miners followed strikes and rumors. The "biggest town of the territory" one year often dwindled to a ghost town twelve months later.

Mining fever and mining successes brought people to Arizona. Population of the new territory doubled between 1860 and 1864, and doubled again by 1870. In the 1880 census, 4,700 miners represented one-fifth of the male workers in the Arizona Territory. By 1909, the number of miners had grown to more than 18,000 (Karpiscak and Wright 1991:101-103).

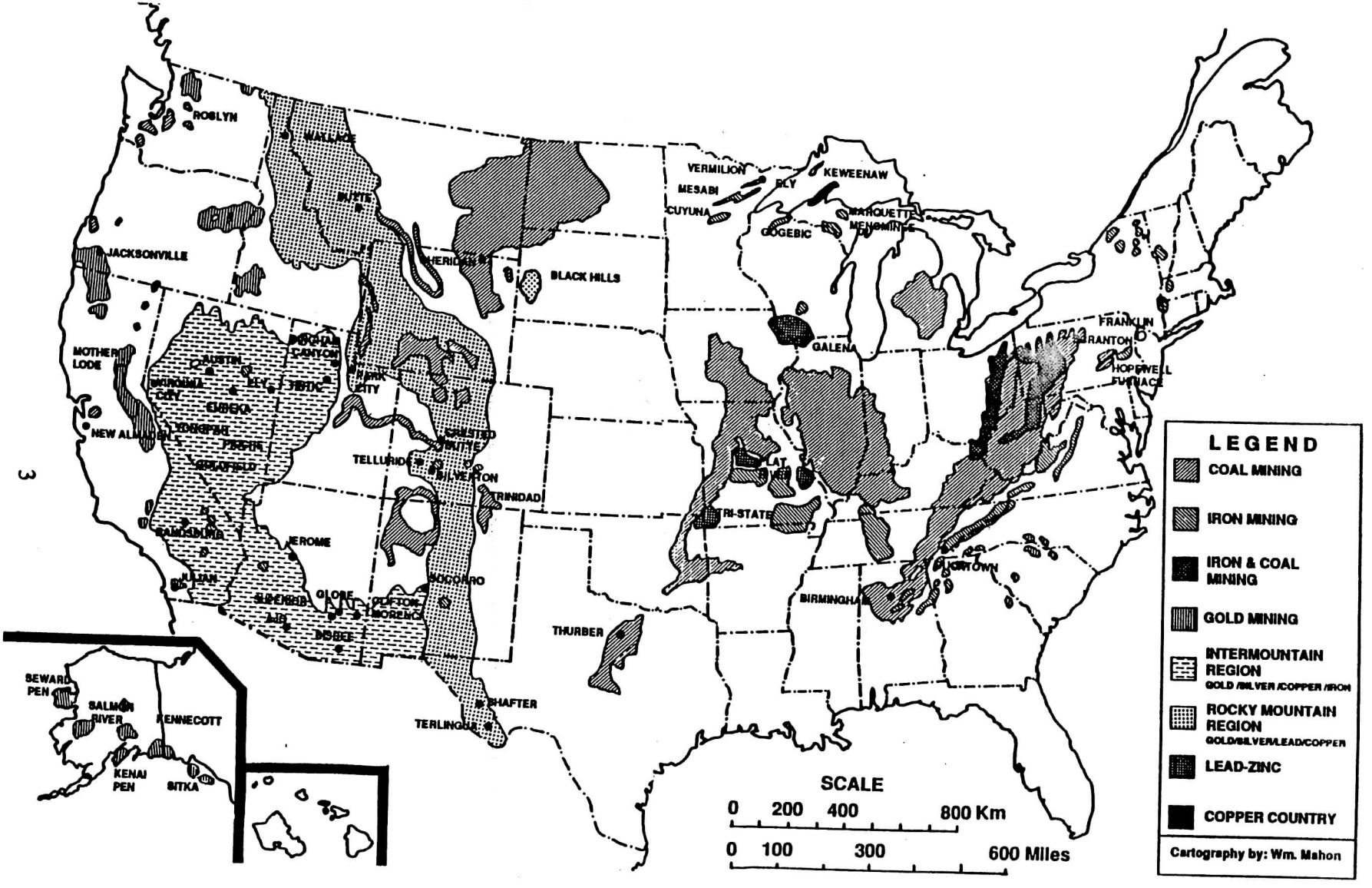
The production of silver dominated the territory's economy during the years 1865-1893, but despite the number and importance of gold and silver strikes in nineteenth century Arizona, the two precious metals have taken a secondary position to copper since 1888. At the time of statehood in 1912, the new state boasted 445 active mines of all kinds (including 51 placer gold operations), 72 concentrating facilities (including stamp mills, concentrators, and four "old-fashioned" arrastras), and 11 smelters (Greeley 1987:25). The mercantile and agricultural towns of Tucson and Phoenix were the largest settlements, followed by the copper mining towns of Clifton/Morenci, Bisbee/Douglas, Globe/Miami, and Jerome (Greeley 1987:25; Sargent 1988:50).

Although silver and gold mining continue to be important to the state's economy, the majority of gold and silver produced in the twentieth century has been a by-product of copper production. Between 1900 and 1940, the smelting of copper ores produced 70 percent of the state's silver production and between 40 and 50 percent of the gold production. In 1981, Arizona ranked first among the United States in production of copper, third in silver, and fourth in production of gold (Hecht and Reeves 1981:53; Nash 1987:135-136; Sonnichsen 1982:98; WPA 1989:89).

But the quest for the hypnotic yellow metal never ends. Gold prospecting continues in the historically gold-rich areas of southern and western Arizona, particularly in Cochise, La Paz, Maricopa, Mohave, Pinal, and Yavapai counties (Karpiscak and Wright 1991:105).

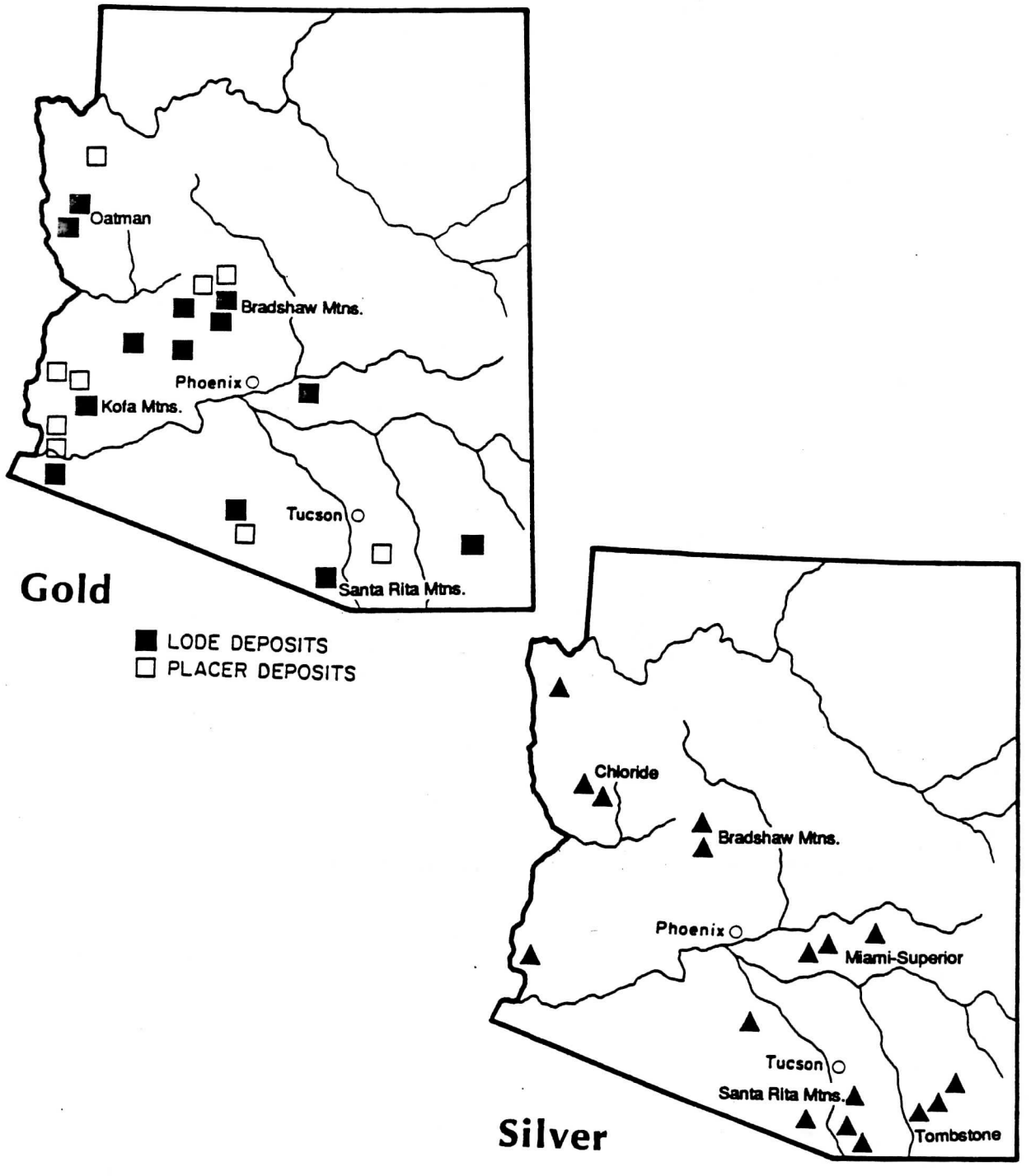
Income, Employment, and Tax Revenue

Gold and silver mining have been extremely important to Arizona's economy over the last 150 years.



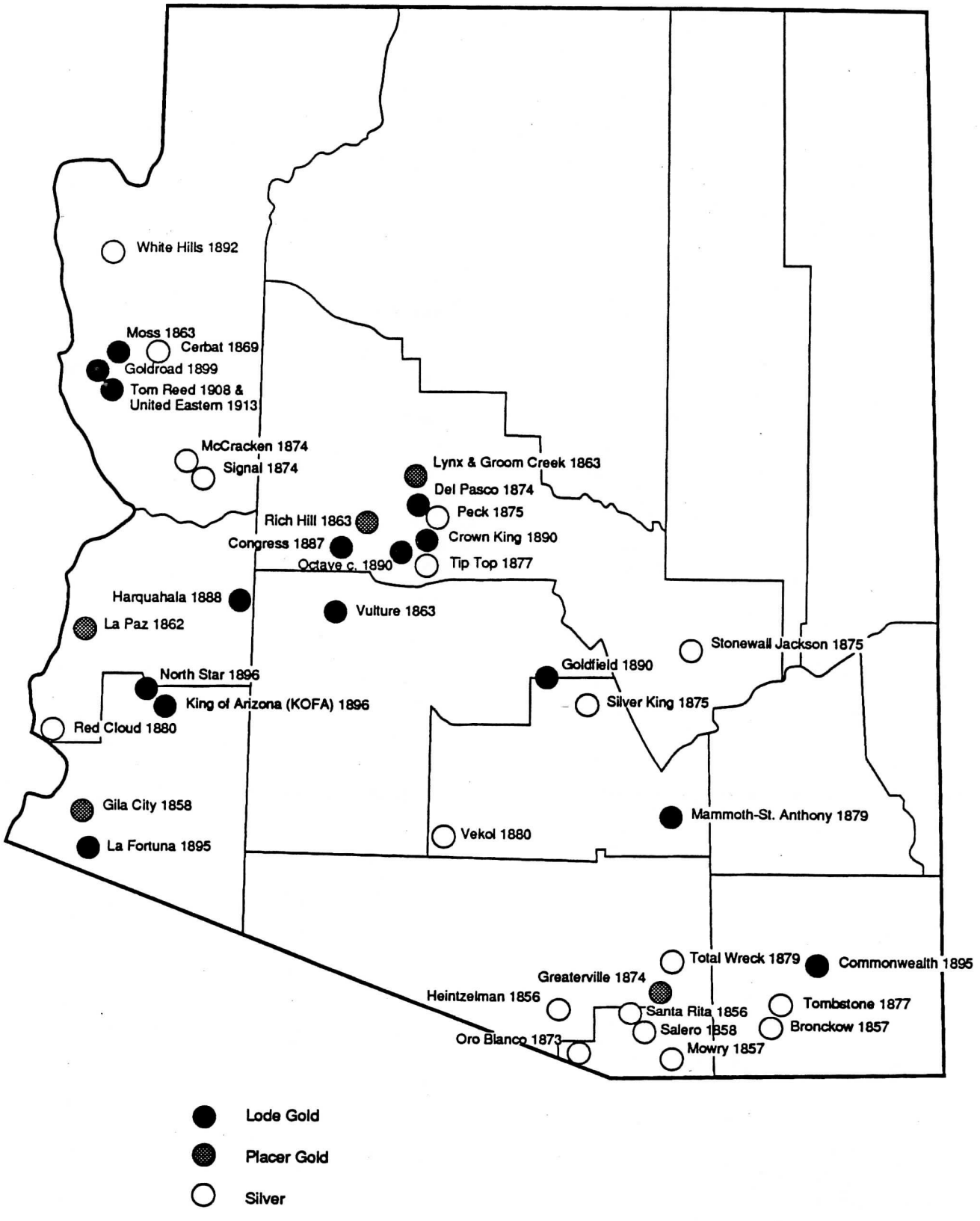
Historic Mining Areas of the United States **Figure 1-1**

(Source: Francavigla 1991:6-7)



Significant Gold and Silver Deposits in Arizona **Figure 1-2**

(Source: Walker and Bufkin 1979:48)



Location of Major Historic Gold and Silver Mines in Arizona **Figure 1-3**
(after Walker and Bufkin, 1979:49)

The precious metals have contributed tax revenues to the state, employment and income to the workers, and attracted outside investment from other states in the United States and foreign countries. Arizona mines have always been assessed local property taxes, and in 1875-1881 and again from 1907-1912, they have paid special taxes on mining revenues (Greeley 1987:23, 25).

Gold, especially placer gold, was of greatest importance to the new territory. Placers along the Gila River at La Paz and along the creeks in the Bradshaw Mountains publicized the mineral wealth of Arizona, but were quickly surpassed by richer lode gold mines at Oatman, the King of Arizona (KOFA) Mine, and the Vulture Mine (Table 1-1). In turn, lode gold has been surpassed by the gold and silver by-products of copper mining. Since the turn of the century, copper has dominated Arizona's economy, but because copper deposits often include gold and silver, the copper mines have continued to produce gold and silver income (Tables 1-2 and 1-3). The biggest silver mines include the mines of Tombstone and Pearce (Nash 1987:135). Other major silver mines were the Tip Top and Peck mines located in the Bradshaw Mountains.

Although it is impossible to determine exact wages and salary figures over the years of gold and silver mining in Arizona, the "total payroll was probably the largest within any one industrial segment of the territory" (Greeley 1987:23). Gold and silver mining has employed thousands of Arizona residents over the last 150 years. In the special census of 1864, almost half (1,080) of the 2,404 working non-Indian male residents of the new Territory of Arizona listed themselves as miners. Relatively large numbers of placer miners worked the deposits at La Paz (1864 population: 353), while others worked in the southern Arizona lode mines at Mowry (1864 population: 252) and Cerro Colorado (1864 population: 45), as well as other smaller mines scattered across central and western Arizona. In the 1880 census, 4,700 miners represented one-fifth of the male workers in the Arizona Territory; at this time, most of these miners would have been working in gold or silver mines as copper was just beginning to emerge as an important mineral (Greeley 1987:19; Karpiscak and Wright 1991:101-103). By 1909, the number of miners working in all 251 Arizona mines had grown to more than 18,000, 21 percent of the total work force. Although many of these would have been working in the large copper mines in Clifton/Morenci, Bisbee/Douglas, Globe/Miami, and Jerome, gold was still listed as the principal product of 67 of the 136 Arizona mining districts listed by the United States Geological Survey in 1910 (Greeley 1987:23).

The fascination with gold mining in the American West lured investment dollars into Arizona from other parts of the United States as well as England. Money from Ohio underwrote the earliest American mines in southern Arizona, Illinois banks financed silver mines in the Bradshaws in the 1880s, and 54 British limited liability joint stock companies sent perhaps as much as $15-20 million into Arizona in the nineteenth century (Ayres and others 1992:27-35; Spude 1992:153; Wagoner 1989: 472).

People and Places

Because the prospecting and mining of silver and gold were so important in the earliest years of the Arizona Territory, they have had long-lasting effects on the state today. Patterns of settlement followed mineral deposits and opened up the austere deserts of southern, central and western portions of Arizona. Prospectors named the natural landmarks, mines, and boom towns after themselves, their

colleagues, and their finds. [For biographical sketches of several individuals important in the state's silver and gold mining industries, refer to Appendix 3].

Although there has been a great deal of discussion on the derivation of the obscure word "Arizona," many historians agree that it derived from a fabulous silver strike. In October 1736, some 20 miles southwest of what is now Nogales, a Yaqui Indian discovered silver lying on the ground in chunks and slabs. Close to an existing mining camp called the "Real de Arizonac," the discovery made named Arizona (Officer 1987:31-32; Walker and Bufkin 1986:48). Ironically, the location of the "Bolas de Plata" silver strike is today in Sonora, Mexico, not Arizona.

Settlements

Prospectors in the West followed different paths than the farmers and ranchers looking to settle here. Although the placer miners often followed creeks, other prospectors clambered over remote hillsides and deserts searching for the telltale quartz outcrops. When a strike was made, hundreds of miners, merchants, saloon keepers, and cooks flocked to the remote locations discovered by the prospectors. Thus, the presence of precious metals across Arizona brought settlements, sometimes ephemeral and sometimes permanent, to terrain that would have never been settled by agriculturalists. The far-flung endeavors of the prospectors and miners are evidenced in many Arizona places named for them, including Walker, Weaverville, Weaver's Needle, Ehrenberg, Wickenburg, Mt. Wrightson, Mt. Hopkins, Greenlee County, Peeples Valley, Poston Butte, and the Bradshaw Mountains (Granger 1960).

Mining communities demanded supplies of food, clothing, medicine, hardware, and building materials, as well as protection from Indians. Army posts and new roads answered these demands; soldiers, freighter, merchants, and farmers supplied the mining communities. Some of those who followed the prospectors and miners established long-lasting businesses of their own. The California Gold Rush can claim Levi Strauss; the Colorado River gold placer rush can claim Michael Goldwater's first stores in Ehrenberg and Prescott. Frederick Ronstadt first came to Arizona prospecting with Peter Brady in Ajo; he stayed to become the progenitor of a famous southern Arizona clan of hardware store owners and musicians (Sonnichsen 1982:57).

Throughout the nineteenth century, Arizona's "largest settlements" were often gold or silver boom towns not obvious in the decennial censuses; settlements appeared and disappeared within a few years. Population shifts following mineral strikes can be seen in the formation of new counties. Growing mining communities caused the counties of Cochise, Gila, Graham, Greenlee, Pinal, and Santa Cruz to be carved out of existing counties (Greeley 1987:21; Walker and Bufkin 1986:32).

Mining interests started Arizona's first newspaper in Tubac; the *Weekly Arizonian* first appeared in March 1859, printed on a hand press. Later that same year, Sylvester Mowry purchased the paper from the publisher, William Wrightson, and moved it to Tucson where he continued to publish it until the outbreak of the Civil War (Granger 1960:326; Wagoner 1989:389-390). The names chosen for other Arizona newspapers mirrored the importance of mining in local communities. The *Arizona Miner* published in 1864 from Fort Whipple became the *Daily Journal-Miner* of Prescott. Other newspaper names included the *Nugget* and the *Daily Prospector* of Tombstone, the *Silver Belt*

TABLE 1-1
Richest Gold Districts of Arizona

	Duration	Metallic Mineral District*	County	Primary Metal Mined**	Ounces of Gold Mined	Metallic Minerals Present				
						Gold	Silver	Copper	Lead	Zinc
1	1880-1981	Warren (Bisbee)	Cochise	Copper	2,792,000	X	X	X	X	X
2	1870-1980	Oatman (Goldroad)	Mohave	Gold	1,966,000	X	X	X		
3	1884-1975	Verde (Jerome)	Yavapai	Copper	1,579,000	X	X	X	X	X
4	1899-1979	Ajo	Pima	Copper	1,558,000	X	X	X	X	
5	1875-1981	Pioneer (Superior)	Pinal	Copper	705,000	X	X	X	X	X
6	1873-1981	Copper Mtn (Morenci)	Greenlee	Copper	504,000	X	X	X	X	X
7	1956-1981	San Manuel	Pinal	Copper	486,000	X	X	X		
8	1902-1969	Big Bug	Yavapai	Zinc	462,000	X	X	X	X	X
9	1887-1950	Martinez (Congress)	Yavapai	Gold, Silver	432,000	X	X	X	X	
10	1867-1966	Vulture	Maricopa	Lead	350,000	X	X	X	X	
11	1886-1981	Mammoth	Pinal	Lead	349,000	X	X	X	X	X
12	1897-1957	KOFA	Yuma	Gold	237,000	X	X	X	X	
13	1895-1970	Rich Hill***	Yavapai	Lead	203,000	X	X	X	X	X
14	1867-1979	Ticonderoga	Yavapai	Lead	189,000	X	X	X	X	X
15	1901-1981	Wallapai (Cerbat, Chloride)	Mohave	Copper	151,000	X	X	X	X	X
16	1888-1963	Little Harquahala	La Paz	Lead	143,000	X	X	X	X	
17	1899-1981	Miami-Inspiration	Gila	Copper	136,000	X	X	X	X	X
18	1879-1981	Tombstone	Cochise	Silver	131,600	X	X	X	X	X
19	1896-1951	Fortuna	Yuma	Gold	131,000	X	X	X	X	X
20	1895-1942	Pearce	Cochise	Silver	130,000	X	X	X	X	X
21	1868-1943	Union Pass (Katherine)	Mohave	Silver	128,000	X	X			
22	1893-1965	Tiger (Crown King)	Yavapai	Zinc	122,000	X	X	X	X	X
23	1875-1981	Globe Hills	Gila	Copper	107,400	X	X	X	X	X

* Metallic mineral districts group mines and mining areas by geological criteria, which do not necessarily correlate with historic mining activities or historic mines. Metallic mineral districts are also distinct from historic "mining districts", which are political entities with indistinct boundaries. However, because the compilation of comparative production figures to date has been done by metallic mineral districts, it is presented here in that fashion. Historic mining areas are indicated in parentheses where applicable.

** by number of pounds produced over the duration.

*** First discovered as a hilltop gold placer in 1863, Rich Hill was re-worked as a lead mine.

Source: Keith and others 1983: 16-55

TABLE 1-2
Gold Production of Arizona
(Estimated values based on a price of $20.67 per ounce of fine gold)

Period	From Lode Gold Mines		From Placers		From Copper Mines		From Lead Mines		Total
	Value	Per cent	Value	Per cent	Value	Per cent	Value	Per cent	Value
1853-1872	$2,860,000	36.4%	$5,000,000	63.6%					$7,860,000
1873-1893	$9,500,000	73.5%	$3,420,000	26.5%					$12,920,000
1898-1903	$16,907,000	70.1%	$1,800,000	7.5%	$4,893,000	20.3%	$500,000	2.1%	$24,100,000
1904-1930	$53,387,000	49.6%	$518,000	0.5%	$49,911,000	46.4%	$3,744,000	3.5%	$107,560,000
1931-1933	$1,706,000 *	30.7% *	*	*	$3,854,000 **	69.3% **	**	**	$5,560,000
Total	$84,360,000	53.4%	$10,738,000	6.8%	$58,658,000	37.1%	$4,244,000	2.7%	$158,000,000

* Gold lode and placer mines combined
** Copper and lead mines combined
Source: Wilson and others 1967:18

TABLE 1-3
Richest Silver Districts of Arizona

	Duration	Metallic Mineral District*	County	Primary Metal Mined**	Ounces of Silver Mined	Metallic Minerals Present				
						Gold	Silver	Copper	Lead	Zinc
1	1880-1981	Warren (Bisbee)	Cochise	Copper	102,215,000	X	X	X	X	X
2	1884-1975	Verde (Jerome)	Yavapai	Copper	57,313,000	X	X	X	X	X
3	1880-1981	Pima	Pima	Copper	56,336,000	X	X	X	X	X
4	1875-1981	Pioneer (Superior)	Pinal	Copper	40,618,000	X	X	X	X	X
5	1875-1981	Tombstone***	Cochise	Silver	32,083,000	X	X	X	X	X
6	1873-1981	Copper Mtn. (Morenci)	Greenlee	Copper	25,690,000	X	X	X	X	X
7	1899-1979	Ajo	Pima	Copper	19,672,000	X	X	X	X	
8	1902-1969	Big Bug	Yavapai	Zinc	16,771,000	X	X	X	X	X
9	1895-1942	Pearce	Cochise	Silver	12,739,000	X	X	X	X	X
10	1901-1981	Wallapai (Cerbat, Chloride)	Mohave	Copper	11,535,000	X	X	X	X	X
11	1899-1981	Miami-Inspiration	Gila	Copper	9,358,000	X	X	X	X	X
12	1956-1981	San Manuel	Pinal	Copper	9,261,000	X	X	X		
13	1905-1981	Mineral Creek (Ray)	Pinal	Copper	8,789,000	X	X	X	X	X
14	1875-1981	Globe Hills	Gila	Copper	8,263,000	X	X	X	X	X
15	1885-1981	Silver Bell	Pima	Copper	5,843,000	X	X	X	X	X
16	1908-1976	Palmetto (Patagonia)	Santa Cruz	Lead	4,905,000	X	X	X	X	X
17	1890-1981	Eureka (Bagdad)	Yavapai	Copper	4,691,000	X	X	X	X	X
18	1903-1976	Oro Blanco	Santa Cruz	Lead	4,340,000	X	X	X	X	X
19	1858-1965	Harshaw (Patagonia)	Santa Cruz	Zinc	4,202,000	X	X	X	X	X
20	1905-1981	Ash Peak	Greenlee	Silver	3,185,000	X	X	X	X	
21	1887-1977	Mineral Hill	Pinal	Copper	2,257,000	X	X	X	X	X
22	1875-1943	Tip Top	Yavapai	Silver	1,910,000	X	X	X	X	
23	1915-1979	Christmas	Gila-Pinal	Copper	1,826,000	X	X	X		
24	1896-1972	Mayer	Yavapai	Copper	1,786,000	X	X	X		
25	1886-1981	Mammoth	Pinal	Lead	1,660,000	X	X	X	X	X
26	1867-1979	Ticonderoga	Yavapai	Lead	1,575,000	X	X	X	X	X
27	1875-1976	Peck****	Yavapai	Silver	1,374,000	X	X	X	X	

TABLE 1-3
Richest Silver Districts of Arizona

	Duration	Metallic Mineral District*	County	Primary Metal Mined**	Ounces of Silver Mined	Metallic Minerals Present				
						Gold	Silver	Copper	Lead	Zinc
28	1880-1951	Silver	La Paz	Lead	1,311,000	X	X	X	X	
29	1870-1980	Oatman	Mohave	Gold	1,147,000	X	X	X		
30	1893-1965	Tiger	Yavapai	Zinc	1,115,000	X	X	X	X	X
31	1929-1981	Casa Grande (Sacaton)	Pinal	Copper	1,081,000	X	X	X		
32	1902-1978	Turquoise	Cochise	Copper	1,049,000	X	X	X	X	
33	1882-1965	Vekol	Pinal	Copper	1,000,000	X	X	X	X	

* Metallic mineral districts group mines and mining areas by geological criteria, which do not necessarily correlate with historic mining activities or historic mines. Metallic mineral districts are also distinct from historic "mining districts", which are political entities with indistinct boundaries. However, because the compilation of comparative production figures to date has been done by metallic mineral districts, it is presented here in that fashion. Historic mining areas are indicated in parentheses where applicable.

** by number of pounds produced over the duration.

*** Although primarily considered a silver mining district, the Tombstone M.M.D. has produced 48 million pounds of lead and almost 8 million pounds of copper to 2 million pounds of silver.

**** Although primarily considered a silver mining district, the Peck M.M.D. has produced 365,000 pounds of lead to almost 86,000 pounds of silver.

Source: Keith and others 1983: 16-55

published in Globe, and the Wickenburg *Miner* (Greeley 1987:22).

Politics

Although the Mexican War brought vast Western lands into the possession of the United States, it was the gold strikes of 1848-1849 that persuaded Congress to create almost immediately the new state of California in 1850. Hopes of similar revenues from Arizona gold placers and silver mines was a major factor that led the revenue-hungry Union government of 1863 to create an Arizona Territory separate from the New Mexico Territory. Opponents cited the high population of Indians (approximately 4,000) and Mexicans (approximately 5,900 of the 6,500 "whites") as deterrents, but the lobbying of Arizona mine owner Samuel Heintzelman and his Ohio investors, and the political savvy of Arizonan Charles Poston pushed the Organic Act through Congress by February 1863. As an illustration of the wealth of the new territory, Poston commissioned Tiffany's to create an elegant inkwell of Arizona silver. He presented it as a gift to President Lincoln; it now is kept in the Library of Congress (Wagoner 1989:469-473).

The locations of county governments also have been influenced by the gold and silver mining industries; three of the five counties that have shifted county seats did so in response to gold and silver strikes. The gold placer boom town of La Paz was the first county seat of Yuma County from 1864-1871; after the placers played out, the county seat shifted to Arizona City, which changed its name to Yuma two years later. From 1881 to 1929, the first county seat of Cochise County was the silver bonanza town of Tombstone. After the mines closed, the nearby copper town of Bisbee became the county seat.

Mohave County, having located and re-located its county government five times, is the champion for moving its county seat according to the whims of mineral strikes. Mohave City and Hardyville, both Colorado River ports, held the honor from 1864-1867 and 1867-1873, respectively. Cerbat, a silver boom town, took over the county seat in 1873 but lost it only four years later to another boom town, Mineral Park. Mineral Park held on to the county seat for ten years before losing it in 1887 to Kingman, located on the railroad.

Legends

Another impact of the fascination with gold has been the creation of one of Arizona's greatest legends. Beginning with a newspaper article in 1895, an extensive folklore has grown up about the lost gold of Jacob Waltz, supposedly cached in the Superstition Mountains east of Phoenix. The alleged location of the "Lost Dutchman Mine," a name coined by a local rancher in the 1890s, is peripheral to the diagonal belt of known metallic deposits running across the state, and has not been the site of any other major gold discovery. However, the continuing appeal of the legend of the Lost Dutchman Mine is evident in the extensive bibliography of books exploring the legend, and on the signs and billboards of the tourist town of Apache Junction. Modern prospectors continue to risk their own health and savings to search for Jacob Waltz's gold (Kearney 1992:117-152).

MAJOR TRENDS AFFECTING THE GOLD AND SILVER MINING INDUSTRY IN ARIZONA

The precious metal mining industries of Arizona have felt reverberations from international and national events as well as regional difficulties.

International War, Treaty, and Investment

International war and international treaty brought Arizona into the United States. Most of the land that has become Arizona was carved from northern Mexico as a result of the treaty that ended the Mexican War of 1846-1848. The last slice, south of the Gila River, was purchased from Mexico as the Gadsden Purchase of 1853. The Mexican War also brought Arizona's first wagon road. The Mormon Battalion, volunteers under the command of Captain Philip St. George Cooke, improved the trail following the Gila River across southern Arizona to California and made it passable for wagons.

International investment boosted Arizona's gold and silver mining industries in the nineteenth century. From 1860 until the beginning of World War I, both American and foreign capitalists exploited natural resources in the western United States. Minerals, along with agricultural, timber, and power resources, passed from the public domain into the hands of private investors. English investors joined Americans in Western mining ventures, both bogus and legitimate. Between 1860 and 1901, British investors poured money into over 50 Arizona mining companies (Ayres and others 1992:29; Spence 1958:238-261).

Spanish and American Mining Law

Spanish mining laws, which governed the first mining ventures in Arizona, proclaimed that all minerals in Spanish lands belonged to the crown. Miners were entitled to only one-third of their mining profits; the rest reverted to the Spanish crown. After 1863, the new Arizona Territory followed American mining laws, including the federal Mining Act of 1872 which "represented the preference of the frontier for minimal federal involvement" by ratifying local procedures rather than giving a leading role to the federal government (Limerick 1987:65). The 1872 Act declared

> The mineral lands of the public domain, both surveyed and unsurveyed, are hereby declared to be free and open to exploration and occupation by all citizens of the United States . . . subject also to the local customs or rules of miners in the several mining districts (as quoted by Limerick 1987:65).

The Mining Act of 1872 provided for "disposition of all its mineral lands by location and patent" (Clark and Verity 1986:1). Although there have been several major changes in the law, none of the modifications has changed the underlying purpose of that law, to open lands to mineral exploration (Ayres and others 1992:32; Karpiscak and Wright 1991:102).

Arizona mining law is complex; a "simplified statement" of federal and state mining laws and regulations published by the State Department of Mines and Mineral Resources runs to 65 pages

(Clark and Verity 1986). Significant points of the law are:

1) Mineral rights may be claimed by registering a mineral claim and expending $100 per year in improvements or labor ("annual assessment work"), a process generally similar to the acquisition of land under the homestead acts.

2) Mining claims may be patented, giving absolute title to the mineral rights. In order to patent a mining claim, there must be a discovery of mineral on the claim, $500 worth of improvements must be made, an approved mineral survey must be made, an application filed, in addition to "other detailed requirements" (Clark and Verity 1986:45).

3) Mineral rights may be owned separately from the surface land. An exception to this portion of the law applies to confirmed Spanish land grants, in which mines and mineral rights were included with the grant of surface land (Clark and Verity 1986:2-4).

4) A claim must be filed as a placer claim, or a lode claim. In some localities, the distinction is difficult to make, particularly at the outset, often before extensive geological exploration has been done; however, the claimant must make a choice between the two types of claims (Clark and Verity 1986:17).

Because of innumerable exceptions and exemptions, it is difficult to generalize the types of land open to mineral prospecting and location. The summation of Arizona mining law, *Mineral Rights in Arizona*, states baldly that "it is impossible to make a general statement that will be instructive regarding whether a specific tract of land is open to mineral entry" (Clark and Verity 1986:2). However, national forests, grazing districts, stock-raising homesteads, power sites, state lands, state game refuges, and state wildlife areas are generally open to acquisition of mineral rights. National parks and monuments, recreational areas, wilderness areas, experimental forests and ranges, military reservations, Indian reservations, agricultural homesteads, national wildlife refuges, Spanish land grants, railroad lands, and the Arizona-Mexico border (considered to be 60 ft wide) are generally closed to acquisition of mineral rights (Clark and Verity 1986:4-16).

Ripple Effects: Bonanzas and Railroads

National events have had ripple effects on Arizona's gold and silver mining industry. The first important example is the westward migrations in response to the gold and silver strikes in California and Nevada. The California Gold Rush attracted tens of thousands of miners to California, many trudging across the road recently built by the Mormon Battalion. Bound for California, they did not stop in Arizona on their way westward. A decade later, in the summer of 1859, Nevada placer miners discovered that the bluish-black sand clogging their sluice boxes was silver ore. After California newspapers announced the find, the rush to the Comstock Lode was on. Prospectors and miners from both the California gold fields and the Nevada silver mines came to Arizona in the early 1860s, hoping to replicate those bonanzas.

A second national occurrence that had an important ripple effect on the Arizona mining industry was the completion of transcontinental railroads. A constant expense in lode gold and silver mining is the transportation of the ore to the smelter for processing. Because only a few smelters were built in Arizona prior to the growth of the copper industry in the late nineteenth century, Arizona mine owners sent their ores to San Francisco and El Paso for smelting. The construction of transcontinental railroads through Arizona in the 1880s greatly reduced these transportation costs (Rickard 1987:191-208; Sherman and Sherman 1969:142).

Price Fluctuations

The value of gold and silver varies as prices fluctuate due to market pressures and federal legislation. A national drop in gold prices after the Civil War brought inflation in silver prices from 1870 to 1884, and consequently, increased prospecting for silver in Arizona. Ten years later, Congress's 1893 repeal of the Sherman Silver Purchase Act caused the price of silver to fall precipitously. "The shrinkage of the value of silver has resulted in the closing of almost all our silver mines," reported Territorial Governor L. C. Hughes in 1893. After 1893, prices for both gold and silver dropped, and copper became the dominant commodity (Ayres and others 1992:28; Sonnichsen 1982:129; WPA 1989:88).

In 1933, a legislative attempt to offset the negative effects of the Great Depression increased the guaranteed price for gold from just over $20 an ounce in 1933 to almost $35 in 1934. Economic pressures of the depression had already re-kindled gold fever, and the new guaranteed high price for gold sent people back out into Arizona stream beds to rework old placers. In 1929, there had been only 22 placer operations in Arizona; by 1934, the number had increased to 179 (Ayres and others 1992:28; Greeley 1987:27).

Silver production in Arizona was similarly affected by recovery legislation. Pushed through Congress by western Congressmen anxious to bolster the silver mining industry in their states, the Silver Purchase Act of 1934 directed the Treasury Department to buy silver. With a guaranteed market, the number of silver mines in the Western states tripled from just over 4,000 in 1931 to more than 12,000 in 1935 (Nash 1973:163).

Conflict Between Native Americans and Invading Euro-Americans

Decades of conflict between the Native Americans residing in Arizona and the Euro-Americans who entered the territory had a profound effect on the course of gold and silver mining in Arizona, delaying its development south of the Gila River and hampering its expansion in the Bradshaw Mountains. The lure of gold and silver helped to bring newcomers to the state; the Native Americans, particularly the Apaches, resisted their incursions into traditional territory.

Prospectors entering the lands of Arizona in the 1850s stepped onto a battlefield and into the middle of a struggle among several cultures for hegemony of the region. For nearly 150 years, the people of Arizona had been battling each other in "unremitting warfare" (Officer 1987:3). Beginning in the late seventeenth century, Spanish, Mexicans, Pimans, and Apaches had been engaged in a seemingly

endless cycle of attack and counter-attack, retaliation, rage, and revenge. [For a detailed discussion of the Spanish and Mexican periods, see Officer 1987.] The bloody, violent clash of cultures would become intricately intertwined with the history of gold and silver mining in Arizona.

In the 1850s, the first American miners began to explore the lands of the Gadsden Purchase, south of the Gila River. At the same time, the Apaches continued their raids of Mexican and Pima settlements in the same area, and included the American newcomers as targets for their raids. Thus, for many Americans, initial contacts with Indian people were violent. Many prospectors and miners met death at the hands of Apaches who thought nothing of the gold and silver the miners sought but fought to protect their territory from the newcomers. Fear of Apache raids, along with the high costs of transporting ore from remote locations, closed several early silver mines. Despite the arrival of American troops in the late 1850s at Fort Buchanan, the Apache delayed American settlement and the development of mining throughout much of what is now southern Arizona.

In 1861, the Civil War in the East drew military troops out of Arizona. Apache and Yavapai (who were often confused with the Apache) perceived the military abandonment as an American admission of defeat, and increased their raiding across southern Arizona and expanded into central Arizona.

The Apaches' sense of victory lasted only two years. In 1863, when news of significant gold discoveries in central Arizona reached Eastern politicians and Union military commanders, they acted to re-establish a strong military presence in the Arizona Territory. The importance of gold and silver to the United States economy brought federal firepower to bear against the Indian people of Arizona. Fort Whipple and Fort Verde opened in 1864, and after Lee's surrender at the Appomattox Courthouse, the federal government sent thousands of trained military men west to battle the Apache people in Arizona. Although the Apache had been successful in slowing the development of mining in southern Arizona prior to the Civil War, that success earned them both a fierce reputation and a war with the United States military, which they eventually lost.

By conquering the Apache people and relegating them to reservations in the late 1870s, the American military intervention eliminated almost all of the attacks and counter attacks between Americans and Apaches (Wagoner 1989:253; Walker and Bufkin 1986:26, 37), but the earlier decades of conflict had left their mark. The tales of slaughter were told and re-told, so that the Apache "menace" continued to live for newcomers to the area, fueled by the press.

> Historians now discount the outrage of the pioneers and the hysterics of the newspapers [circa 1885], attributing ulterior motives to the merchants and editors as they demanded more soldiers to chase Indians and bring more business to Arizona and New Mexico. To the white people involved, this would have been utter nonsense, convinced as they were that the lives of every man, woman, and child in the territories were in deadly peril (Sonnichsen 1986:8).

It was just this fear of an Apache attack that named one of the most famous historic mining towns in Arizona. When prospector Ed Schieffelin took out from Camp Huachuca in 1877 to prospect the hills to the east, he was repeatedly warned that the only thing he would find would be his tombstone. By traveling alone and camping without fires, Schieffelin did not attract the attention of any Apaches, and discovered silver in 1878 at a place he called Tombstone.

In reading historical accounts of "Indian trouble," we must continually remind ourselves that Indian tribes were separate cultural entities, led by distinct personalities who responded differently to the invading Euro-Americans. We must continually resist the ethnocentric temptation to paint all Native Americans in the Arizona Territory, or even all of the Apaches, as marauders. In the midst of the conflicts with Yavapais and Apaches in central Arizona in the 1860s, history gives us a counter example of a very different sort of Native American leader. Grateful for the Indian agent's fair dealings with his tribe, Iretaba, chief of the Mohave tribe in northwestern Arizona, showed Captain John Moss the location of an outcropping of lode gold in 1863 or 1864. The shallow deposit, only ten feet deep and ten feet in diameter, yielded $250,000 in gold (Granger 1960:217).

The history of the bloody conflict between the American and the Apache peoples cannot be separated from the history of gold and silver mining in Arizona. Deadly Apache raids successfully hindered the growth of American mining and settlement in the Gadsden Purchase before the Civil War. After the war, the Americans unleashed a brutally successful military campaign to eliminate the Apache threat to the precious metals so important to the national economy. Without the Apache threat, the American settlement of southern Arizona would have evolved differently, and towns such as Tombstone might have been founded earlier. Certainly, without the gold and silver so attractive to Americans, Apache control of the territory would have continued for a longer time and changed the history of the Apache people.

MAJOR TECHNOLOGICAL DEVELOPMENTS IN GOLD AND SILVER MINING

Although primitive technologies such as the arrastra and mercury amalgamation continued to be used in small, remote mining operations, the mainstream of Arizona miners quickly adopted improved technologies as they became available.

Geology of Gold and Silver Deposits

The five minerals of the ancient world, gold, silver, copper, mercury, and lead, are found in association with each other in outcrops of igneous rocks. These outcrops are often found in the deserts of the world, unencumbered by a covering of soil and vegetation. Igneous rock of Precambrian and Tertiary age are the most likely formations to have mineralization; occasionally, these two formations are found in conjunction with each other, as in the Bradshaw Mountains of central Arizona. Minerals are chiefly found in association with silicon dioxide, or quartz; granite is more than half silicon dioxide (Young 1970:6, 12-13, 15-16).

Mining of Gold and Silver Deposits

The many terms used to describe gold and silver ores often connote the location as well as the chemical composition of the ores; mining techniques vary according to the location and chemical composition of the ores.

Native Gold and Silver

Gold in its metallic form is called native gold and can be found on the surface of the ground. Such gold usually contains variable amounts of silver, copper, platinum, palladium or certain other elements combined with the gold (Encyclopedia Britannica 1991:411). Native silver is obviously metallic, even to the untrained eye, while silver ore is usually an earthy green or black, heavy, crumbly, but malleable mass. Both native silver and silver ore may be found on the ground surface.

Placer Mining

Placer gold is found as dust, grains, and sometimes nuggets, in placer deposits, that is, stream-deposited sands and gravels eroded from bed rock. The mining of gold from placer deposits depends on mechanical means of separating the heavier gold from surrounding sand and gravels. Simple placer mining techniques have been used in Arizona since the Spanish occupation (Figure 1-4). Improvements on the simple gold panning techniques have included the cradle or rocker, which evolved into the larger sluice box or corduroy table. Each of these captured placer gold in riffles across the bottom of the apparatus (Ayres and others 1992:15; Young 1970:25).

Hydraulic mining and dredging are further elaborations of simple gold panning techniques. In hydraulic mining, great washes of water under high pressure are directed at placer deposits in gravel banks, loosening them and washing the loose rock into sluices to extract the gold. Dredging machinery scrapes up large amounts of gravel from river bottoms and dumps it into sluices. Both hydraulic mining and dredging can work through large amounts of placer gravels at a low cost, after the initial capital expense. A by-product of each technique is large piles of re-deposited gravel in characteristic patterns (Ayres and others 1992:152-156).

Underground Mining

Lode gold and silver are found in veins of ore in hard rock, usually quartz, but can be invisible to the eye. The prospector hunted for just the right kind of quartz, picked off a few chunks, and then sent them to be assayed; the chemical assay process indicated the value of gold and silver in the ore and the presence of other metals such as lead and copper.

Although silver may be found as native silver, it is more often found as argentite (silver sulfide), or as a by-product of lead, copper, and zinc ores. In the upper levels of a silver lode where the ore lies above the water table, the sulphurs are converted to chlorides. The ore in this upper, oxidized zone has been naturally concentrated and is more easily smelted than the ore below the water table, which has been protected from weathering and decomposition. Prospectors who mined these close-to-the-surface deposits were known by the derogatory term, "chloriders." Underground, unoxidized silver deposits found below the water table are known as "sulphurets," and are more difficult to extract from ore.

In contrast to the solitary technology of gold placer mining, the lode miner worked within a complex system of men, animals, and machinery to drill tunnels into the ground, blast ore from the

Panning for Gold ***Figure 1-4***

(Source: Young 1970:23)

underground rock, and transport it to the surface (Figure 1-5, Figure 1-6, Figure 1-7). Once above ground, the ore was crushed, and the precious metals were separated from the rock by mechanical and chemical processes.

Silver and gold are also found in association with most lead and copper deposits, and are obtained as by-products of smelting those minerals. "Fool's gold," the yellow disulfide of iron (FeS2), contains no gold.

Extracting Gold and Silver Ores

After the ore is mined from underground, precious metals are extracted from the rock in a two-step process. The first step crushes the ore into smaller and smaller pieces of rock, and eventually to a powder. This mechanical process of breaking rock into smaller pieces of rock is often referred to as "milling," and is the first step in extracting metal from ore.

The second step in extracting metal from ore varies according to the chemical composition of the ore. With "free milling" gold and silver which is easily separated from the rock, the second step uses simple mechanical collection methods to separate the heavier precious metals from the lighter rock. With more complex ores, the second step requires a chemical process to collect the metal from the rock, such as mercury amalgamation or cyanide leaching. The most complex ores, lead compounds, require the heat of smelting to extract precious metals.

The bulk of the following summary has been adapted from Hardesty's (1988) excellent explanation of mining for archaeologists. The reader interested in understanding the process of mining is advised to read through Hardesty's work before tackling the more difficult and obscure journals written by and for mining engineers.

Assaying

The assayer's office is a familiar prop in the American West of Hollywood. Because the precise content of silver or gold in ore cannot be determined by the prospector's eye, ore samples must be assayed to determine their metallic content, and thus, their value. Assaying may also be used at several points of the extraction process to determine metallic content of concentrates as they are produced by the refining process.

The assay process has been essentially the same for at least 500 years (Hardesty 1988:38). Assaying begins by crushing the ore sample to a powder and melting it. The molten sample is poured into a cast-iron mold. After cooling, the exterior slag is chipped off, revealing an interior "button" of silver/lead/gold. The button is heated again, this time in a bone-ash crucible, which absorbs any lead oxide and leaves the free gold and/or silver (Hardesty 1988:38). It is only after this complicated process that the assayer is able to determine the precise content of gold or silver in the ore sample.

The assayed value of an ore sample is only an estimate of the content of metal in the sample, and can only be used as a guideline. The assayed value of an ore is not necessarily retrievable with bulk

milling and refining procedures.

Crushing and Grinding

The use of the terms "mill" and "milling" is not precise. Sometimes, milling connotes simply the mechanical ore crushing process; sometimes the term is used to refer to the entire process of extracting ore from rock, including crushing, collection, smelting, and refining (Hardesty 1988:38-66).

The Spanish, Mexican, and early American miners in Arizona used an apparatus known as an arrastra to crush rock. Ore was dumped onto the characteristic round floor made of flat stones; mules dragged large, weighty rocks over the ore to crush it (Figure 1-8). Simple to assemble and cheap to operate, the arrastra remained in use and essentially unchanged for over 300 years (Young 1970:149-151).

Several different milling machines have been invented over the last 150 years to improve on the arrastra, the most significant being the stamp mill. "Universal in the West after 1853," the stamp mill crushed ore with vertical action rather than the circular action of the arrastra, and was the most commonly used rock crushing machine in Arizona (Figure 1-9) (Young 1970:197). The "awkward and ear-splitting" stamp mills were popular because

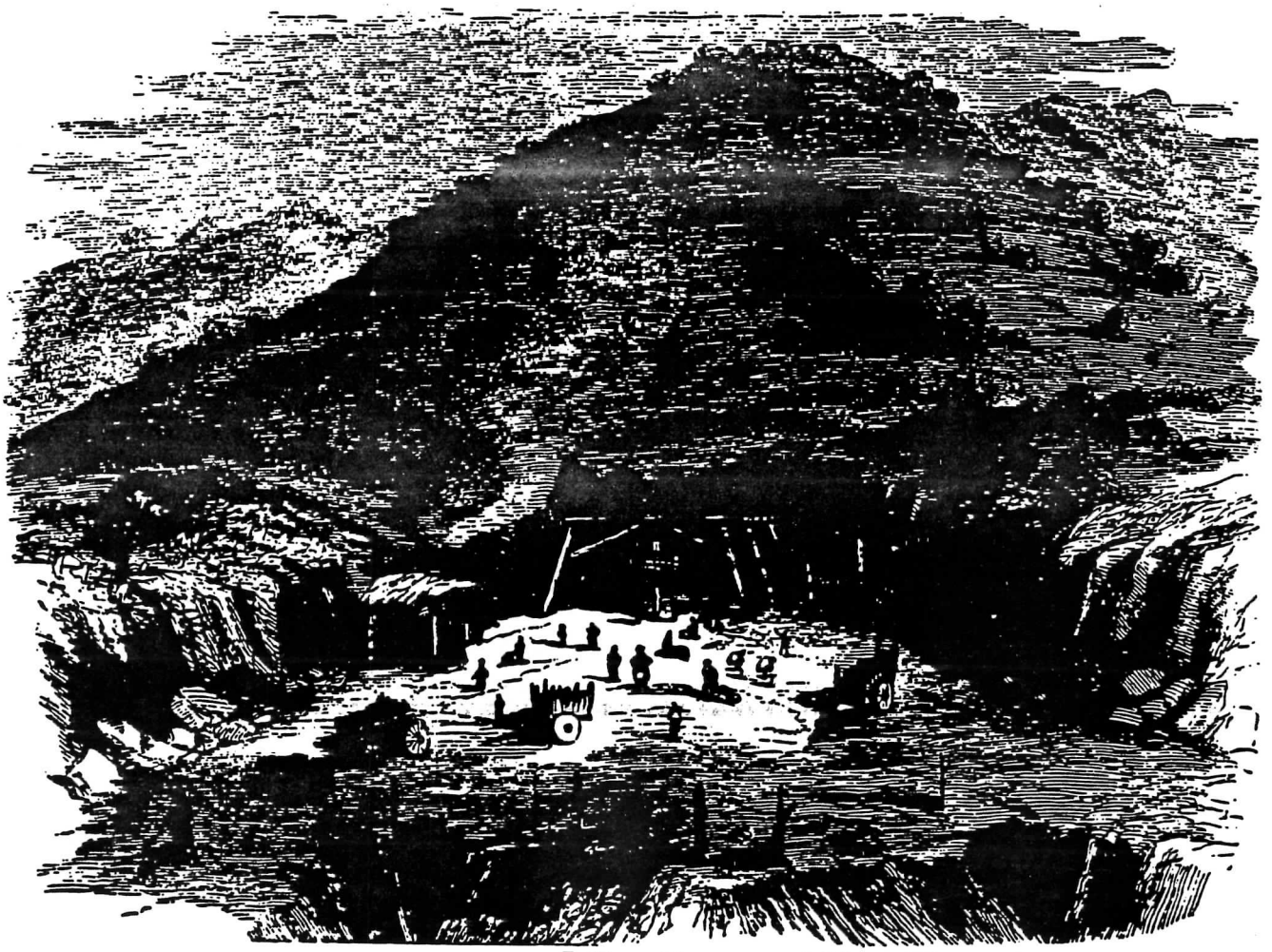
> they were readily transportable, comparatively easy to erect upon wooden framing, cheap to operate, stressed chiefly in compression, and repairable even by a journeyman blacksmith. They required no delicacy of handling or construction, and the few moving parts could be cast well enough to obviate any need for fine machining (Young 1970:198).

Stamp mills could be operated either "wet" or "dry;" in Arizona mining districts, mills were often built near a water source. For example, a mill for the McCracken Mine was built about 12 miles away at Greenwood City on the Big Sandy River, and several mills for the Tombstone district mines were built six to twelve miles to the west of town along the San Pedro River (Cook 1987:230). In the late nineteenth century and into the twentieth century, new chemical methods of recovering precious metals required the ore to be crushed into sand or "slime;" the ball, tube, or rod mills accomplished this.

Used in conjunction with rock crushing and grinding machines, "classifiers" separated ore by particle size. "Grizzlies," "Trommels," and "Dorr classifiers" used systems of screens and grates to sort larger rocks from smaller rocks, and smaller rocks from slime.

Simple Collection Methods

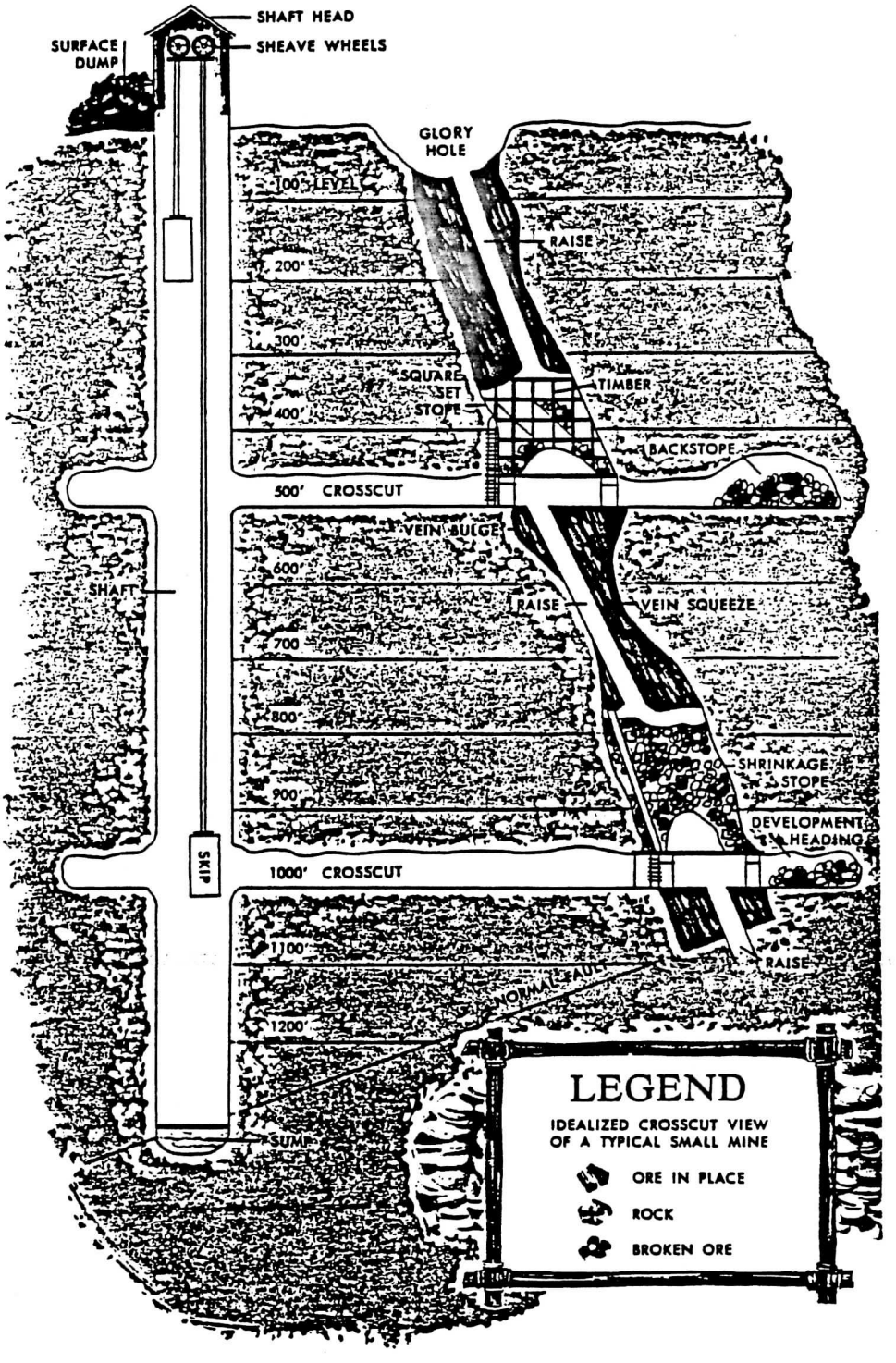
Only a simple crushing was needed to separate free milling ore from its surrounding *rock or gangue*. The particles of gold or silver could be collected and concentrated by simple gravity methods, but more thorough retrieval, particularly of the finer particles, could be achieved by using mercury. The mercury combined with the gold and silver to form an amalgam; the amalgam was then heated to vaporize the mercury and leave the gold or silver as a residue. The mercury was condensed from the



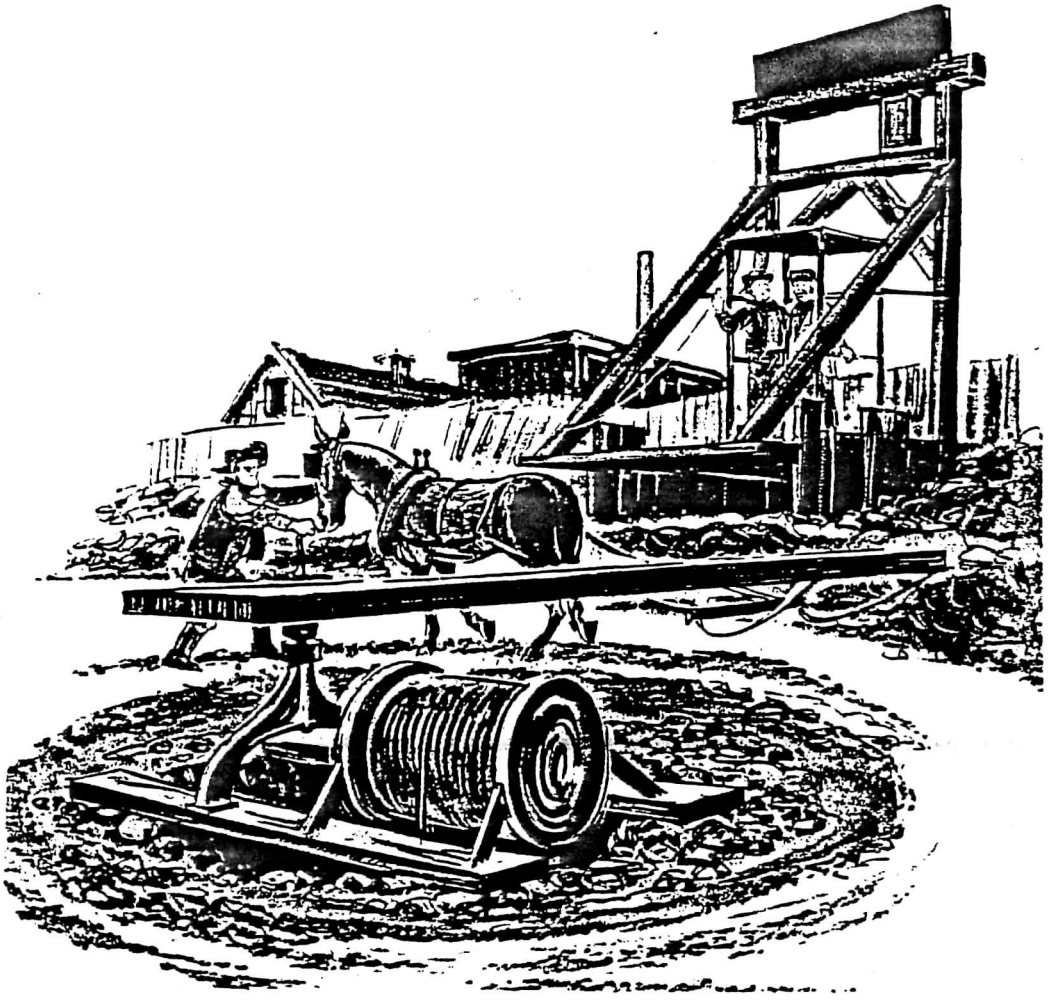
J. Ross Browne, *A Tour Through Arizona, 1864*

Entrance to the Mowry Mine, 1864 **Figure 1-5**

(Source: Wagoner 1989:418)

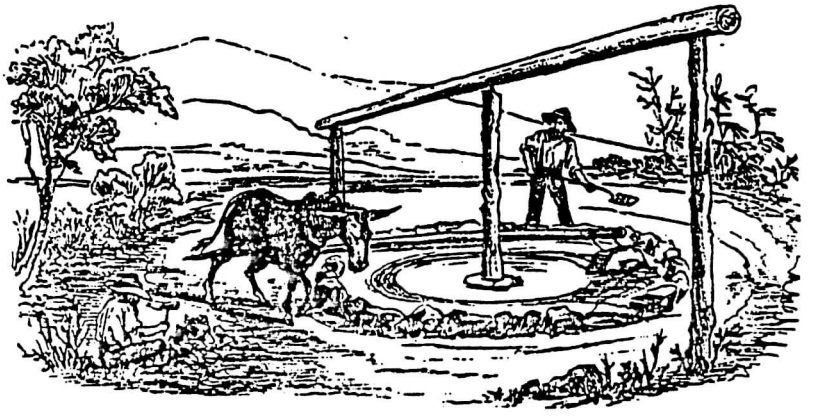


(Source: Place 1961:28) **Figure 1-6**



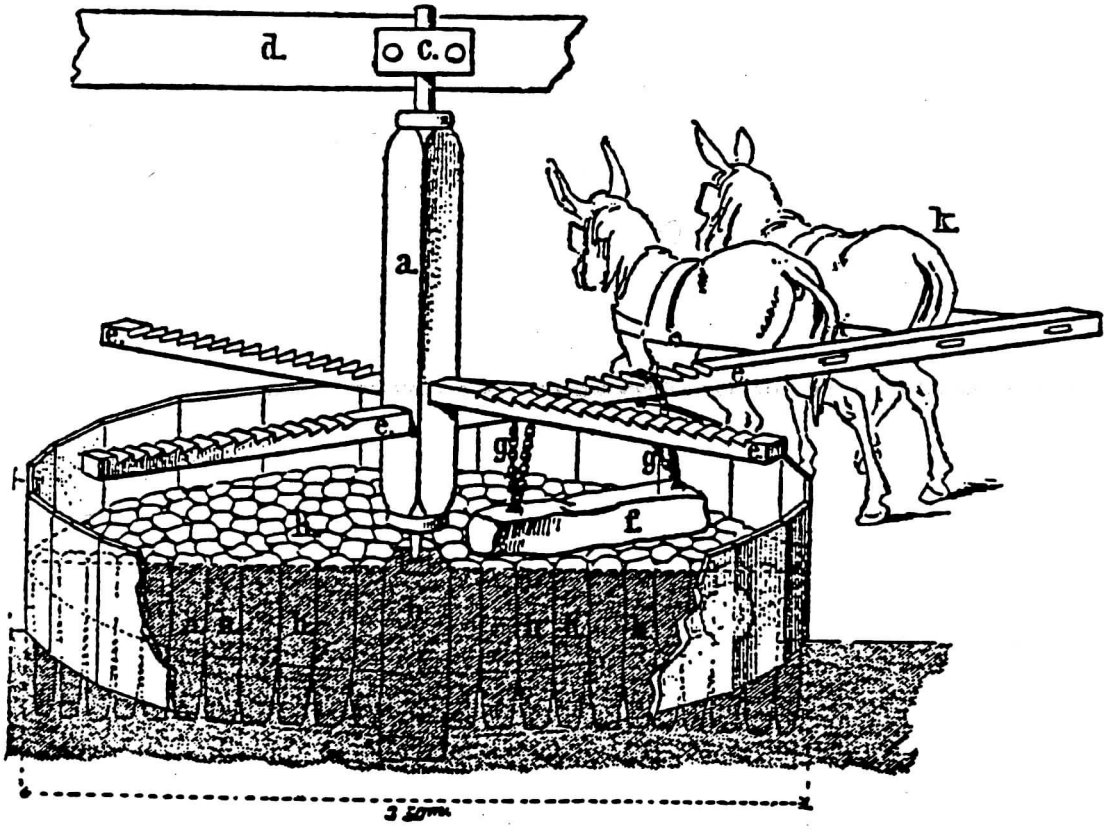
Sketch of a Horse Powered Whim **Figure 1-7**

(Source: Place 1961:16)



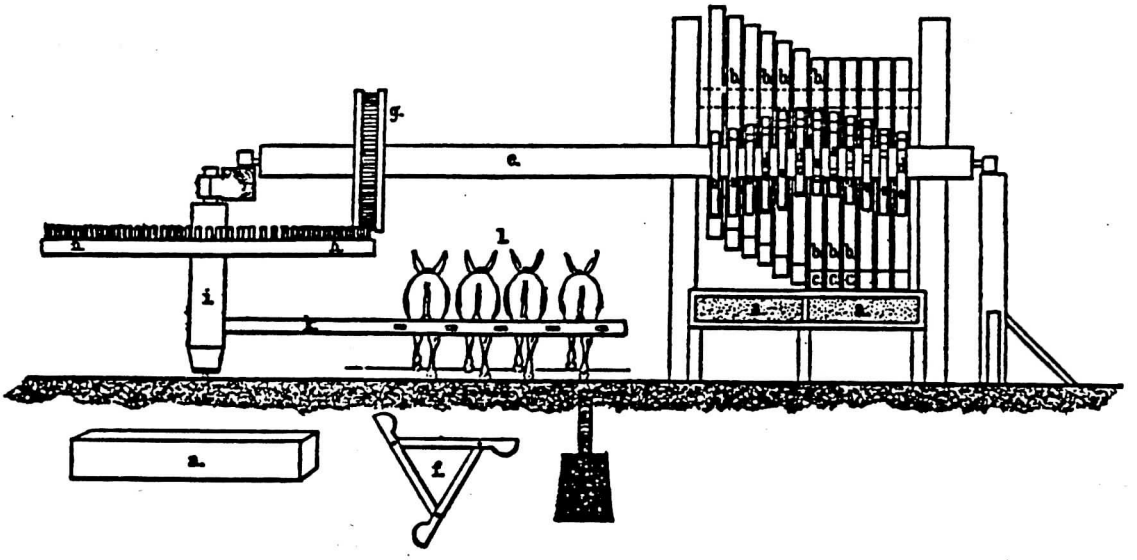
Mexican Arrastra, circa 1887

(Source: Hardesty 1988:10)



Arrastra with One Drag Stone, circa 1907 **Figure 1-8**

(Source: Young 1970:70)



A ten-stamp mill driven by animal power. *a*, battery; *b*, stamps; *c*, shoes; *d*, lifter pegs; *e*, drive shaft; *f*, side view of wooden cam; *g*, vertical crown gear; *h*, horizontal crown gear; *i*, vertical drive shaft; *k*, harness pole; *l*, mules.

Sketch of a Stamp Mill, circa 1907 **Figure 1-9**

(Source: Young 1970:74)

vapor, and re-used. Fumes produced by heating the amalgam are toxic (Hardesty 1988:43-44).

Many ores were not free-milling, and concentrators were used to produce a higher grade of ore, which still needed further smelting to remove the metals. An outgrowth of the theory of placer mining, concentrating machines such as "jigs," "buddles," "vanners," "Wilfley tables," and "Embrey tables" shook and vibrated crushed ores to separate the heavier metals from the lighter surrounding rock (Hardesty 1988:43; Young 1970:136).

Flotation was a twentieth century invention to separate metals from gangue. Air bubbles were pumped thorough a mixture of finely ground ore and water; greasy or oily flotation agents such as pine oil attached to the metallic particles. The mixture of oil and metallic particles could be skimmed from the surface of the solution. By the time of its wide use in about 1910, flotation had already been replaced by cyanidation in the processing of gold and silver, but it continued to be used widely in copper processing (Hardesty 1988:44; Young 1970:233).

Complex Collection Methods

The patio process, the first industrial chemical process to refine silver, was invented in Mexico in 1554 by an amateur miner, Bartolome de Medina of Spain. After crushing ore in an arrastra, he mixed ore with salt, copper sulfate, and mercury, and allowed the "pulp" to cure in the sun for two to six weeks. The fierce heat of the sun speeded the chemical reaction that combined the silver with mercury. The silver amalgam was collected and heated to drive off the mercury, leaving pure silver. This process was used for three hundred years, particularly in areas of low skilled laborers and limited water and fuel supplies. Pan amalgamation adopted the patio process to colder climes. Heat was provided not by the sun, but by steam heating the large metal tubs, or pans containing the pulp (Hardesty 1988:44; Young 1970:74-76).

The Frieburg, Von Patera, and Russell chemical collection processes used various acidic and basic solutions to leach metals from crushed ores. The Frieburg chlorination process was used widely in Appalachian gold fields, the Black Hills of South Dakota, and the Cripple Creek region of Colorado, and the Von Patera and Russell were used in the Comstock Lode in Nevada (Hardesty 1988:47-51).

A technique developed in England by three Scottish chemists revolutionized first gold, and later silver, processing; the "development of cyanidation made obsolete every mill and virtually every milling process used to extract gold" (Young 1970:283). The new process leached nearly all the gold from low grade ores. To the amateur's ear, the word *cyanide* caries a deadly import; in practice, highly diluted cyanide is not particularly dangerous. In addition to cyanide's affinity for gold, it is neither explosive, highly corrosive, or unstable.

In 1889, the first cyanide leaching plant was built in New Zealand; by 1891, the first cyanide plants were being built in the United States. The cyanidation process utilized cyanide in solution to dissolve silver and gold from crushed ore. A cyanide solution was washed through rock that had been crushed to sand or slime, and the cyanide attached to the gold and silver. Zinc was added to precipitate the gold and silver into bullion, known as dore. Mercury amalgamation may recover as much as 60 percent of the precious metals from ore, while the cyanide process may recover as much as 95 percent

(Encyclopedia Britannica 1991:412; Hardesty 1988:51-65; Young 1970:284).

Because cyanidation extracted gold from tailings and waste as well as from low grade ore, the introduction of the new process caused the gold boom of 1890-1917, a boom as important but not nearly so well-known as the California Gold Rush or the Comstock Lode. Despite the great rush of miners hurrying to re-work waste from earlier mines, "this boom attracted little attention because it was devoid of what the public considers glamour" (Walker and Bufkin 1986:48; WPA 1989:89; Young 1970:285).

Smelting

Gold and silver ores combined with lead were the most difficult to extract; the high heat of smelter blast furnaces was required. The heat melted the metallic ores which flowed out of the furnace and were collected as lead-silver-gold bullion. The rest of the melted rock flowed out of the smelter separately and was collected as slag (Hardesty 1988:65).

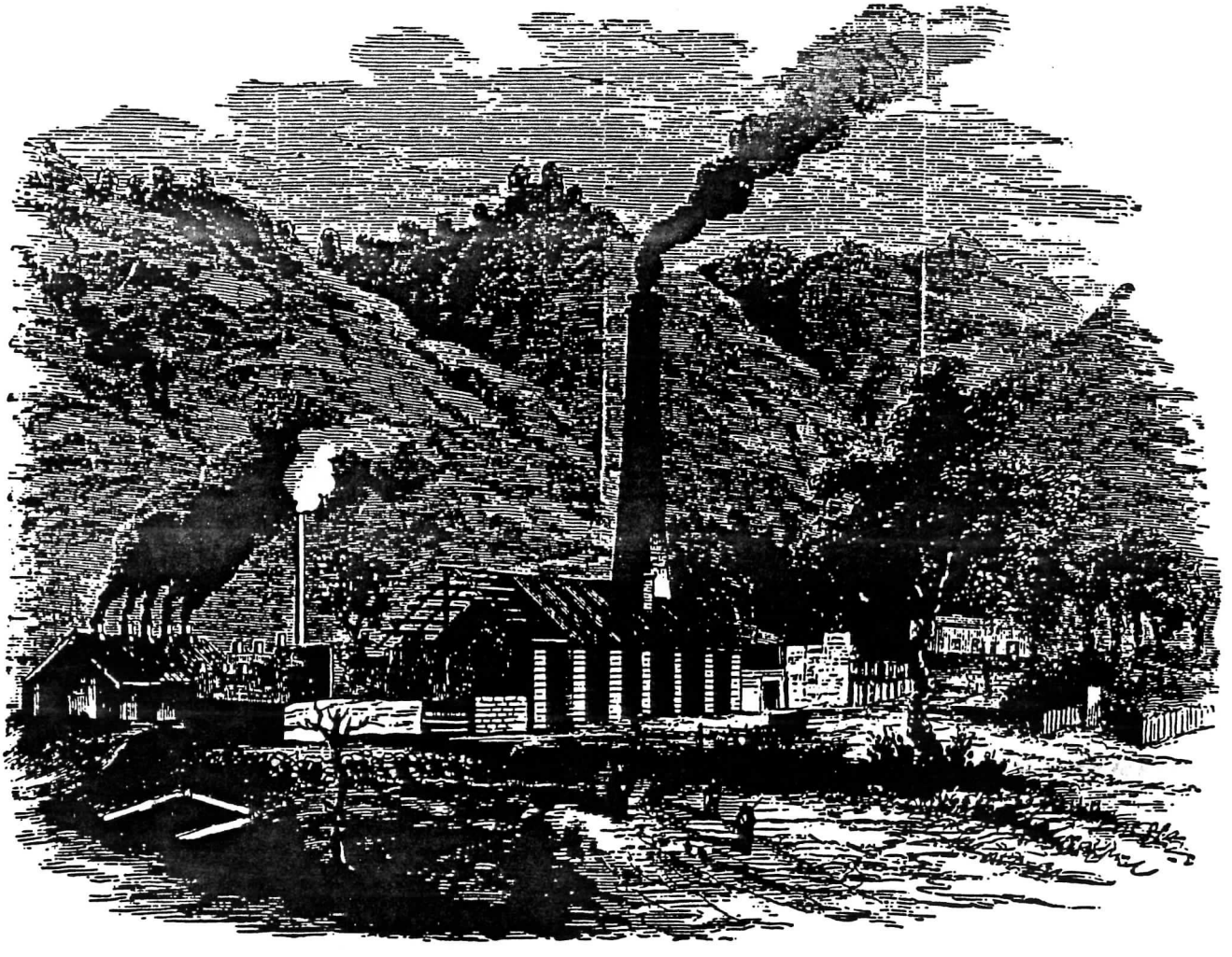
Before the establishment of the copper industry in the late nineteenth century, there were few smelters in Arizona; crushed and concentrated ores were shipped to San Francisco or El Paso for smelting. [Some copper ores, such as those from Ajo, were shipped all the way to Swansea, Wales, for smelting.] An early, simple smelter was built at the silver/lead Mowry Mine in southern Arizona (Figure 1-10) (Rickard 1987:191).

REVIVING HISPANIC MINING IN SOUTHERN ARIZONA, PRE-1848 TO 1861

The first Europeans to enter Arizona came looking for gold and silver. Because riches of Aztec gold stores and Durango silver mines had flowed from New Spain to Spain for decades, Spanish explorers De Niza, Coronado, and Espejo prospected the northern reaches of New Spain in the sixteenth century to duplicate the earlier discoveries. Each returned to Mexico City empty-handed, having been unable to find the legendary golden "Seven Cities of Cíbola."

Throughout the Pímeria Alta, the area of northern New Spain south of the Gila River, Spanish and later Mexican miners established a few small-scale, short-lived mines. The first boom in what was still the northern reaches of Spanish territory came in 1736. About 20 miles southwest of present-day Nogales at a ranchería known as *Arizonac* or *Arissona*, Yaqui miner Antonio Siraumea picked up chunks of silver exposed on the surface of the ground. The area became known as *Las Bolas de Plata* or *Las Planchas de Plata* and reputedly produced about four thousand pounds of silver, many in large chunks (*bolas*) and slabs (*planchas*). Despite the extraordinary find, the silver at Arizonac soon played out and all mines in the area were closed down in 1741 (Wagoner 1989:102-103; Walker and Bufkin 1986:48).

Later the same century, Spanish explorers discovered silver and copper deposits at Ajo, as well as two silver lodes in the Santa Rita Mountains south of Tucson. However, these finds were not developed; the distance from Mexico City, the desolate terrain, the lack of water, and the conflict with the Apaches discouraged full-scale mining (Officer 1987:15-16; Young 1970:100). In 1804, Captain



J. Ross Browne, *A Tour Through Arizona, 1864*

Headquarters and Smelter of the Mowry Mine, 1864 **Figure 1-10**

(Source: Wagoner 1989:457)

José de Zúñiga of the Tucson outpost reported that "we have no gold, silver, lead, tin, quicksilver, copper mines, or marble quarries" (Officer 1987:81).

Although historical Spanish sources examined by the noted Borderlands historian H. H. Bancroft led him to state that the Spanish worked only a few mines in Arizona, field evidence of Spanish mining endeavors would seem to contradict the written sources. In addition to the mines known from written sources located at San Xavier del Bac, Guevavi, Tubac, and in the Santa Rita Mountains, nineteenth century American miners noted traces of old mines (*antiguas*) across southern Arizona in the Santa Catalina Mountains, in the mining districts of Aztec, Oro Blanco (Ruby), Patagonia, Sierrita, and Quijotoa, and near Tucson. In Mojave County, the tailings at the Oro Plata Mine also indicated earlier operations, perhaps by the Spanish (Hale 1981:13).

Exploring the Gadsden Purchase Lands

The next group of gold and silver seekers came from the west. Originally brought west by the promise of gold in California, mining pioneers had traveled through Arizona without stopping. Despite the boom in California population in the 1850s, the old Spanish town of Tubac in southern Arizona housed only about 300 inhabitants in 1860 (Wagoner 1989:383). The well-known mining successes in California led promoters to look at investing in the newly acquired lands of southern Arizona, the Gadsden Purchase.

Some of the first American and European settlers in southern Arizona in the 1850s were mine developers interested in the potential for gold and silver in the region. Men such as Charles Poston, Herman Ehrenberg, Samuel Heintzelman, and Sylvester Mowry organized mining companies to explore the newly acquired Gadsden Purchase. Using Tubac as a base, they opened mines in the Santa Rita and Cerro Colorado mountains (Wagoner 1989:383-385).

Often termed the "Father of Arizona" for his many years of promoting the territory, Charles Poston had surveyed the Santa Rita Mountains south of Tucson as early as 1854 searching for riches. In 1856, only three years after the Gadsden Purchase, he and his partners established the Heintzleman Mine at Cerro Colorado near Arivaca, and the Santa Rita Mine in the Santa Rita Mountains. Mexicans who had left the area returned to work in the new mines (Officer 1987:16).

Poston had "discovered" the silver deposits identified by the Spaniards, but also discovered the same difficulties encountered a century before. Long distances and high capital investment costs drained profit from the several mining companies founded by Poston and his partners, Herman Ehrenberg and Samuel Heintzelman, and one historian has speculated that their several mining adventures all lost money (Wagoner 1989:385, footnote).

Poston and his associates were not the only prospectors and promoters in southern Arizona during the 1850s. In 1854, a party financed out of San Francisco organized a mining and trading company to prospect southern Arizona. The party split up; Peter Brady found copper in Ajo and others picked up a piece of native silver at Arizonac (Officer 1987:279). The Arizonac mine, however, was located in Mexican territory, and the company was forced to abandon it; the copper mine in Ajo was also abandoned due to the high costs of shipping the ore to Wales for processing (Wagoner 1989:387).

Frederick Brunckow, a well-educated German engineer-turned-prospector, developed a silver mine in 1857. Located to the east of Poston's and Mowry's diggings in the Santa Rita Mountains and south of the later-discovered Tombstone area silver deposits, the mine was short-lived due to Brunckow's murder; his body was thrown down the shaft (Granger 1960:32).

Most of the early mining operations in southern Arizona were "chloriders," working surface outcrops by open-pit methods. Only Sylvester Mowry, operating a mine in the Patagonia Mountains in the late 1850s and early 1860s, dug deep enough to uncover "sulphurets," or silver combined with sulphur rather than chloride. Mowry had come to Arizona as the commanding officer at Fort Yuma and had resigned his military post to prospect in southern Arizona. The Patagonia mine prospered quickly, employing "a camp of some four hundred inhabitants by 1862" (Wagoner 1989:456-457). The boom was short-lived, however. General Carleton, the Union commander in Tucson, arrested Mowry and accused him of supporting the Confederacy, and Sylvester Mowry's Patagonia holdings were seized and sold at auction later the same year (Wagoner 1989:459-461).

The corporation of eastern investors organized by Charles Poston operated mines near Arivaca and Tubac until 1861. That year, the troops stationed at Fort Buchanan and other forts in Arizona were sent east to fight in the Civil War. The boom in Tubac mining was over. In 1863, the mines were sold to a Rhode Island corporation, the Arizona Land and Mining Company. Later owners/operators of the mines included Charles Poston (1870), and the Arivaca Land and Cattle Company (1893). In 1902, after the U. S. Supreme Court denied confirmation of the old Spanish land grant because of its uncertain boundaries, the land was returned to the public domain (Wagoner 1989:210-214).

Gold at Guevavi

The oldest gold mining site in southern Arizona seems to have been the area near the Spanish mission church of Guevavi, just north of the present-day Arizona-Mexico border east of Nogales. The site is mentioned in Spanish documents of the mid-18th century (Officer 1987:380, note 21). Gold mines developed near the mission of Guevavi in the mid eighteenth century were operated sporadically into the nineteenth century (Officer 1987:15). In 1848, Lieutenant Cave Johnson Couts, an American soldier, recorded meeting Mexican gold miners near the old mission site of Guevavi; a spokesman for the miners intimated that the area was not particularly productive at the same time that he held a nugget weighing 2.5 ounces (Officer 1987:211).

PLACERING, PROSPECTING, AND HARD ROCK GOLD MINING IN WEST-CENTRAL ARIZONA, 1858-1870

In the 1820s and 1830s in many parts of the American West, the prospect of beaver skins lured trappers up mountain streams and along existing Indian trails. The Gila River, running generally east to west across south central Arizona, was one such path. As early as 1825, trappers utilized the Gila River as a guide, a water supply, and a source of beaver skins. By 1846, the Gila Trail had become a well-known and well-used trail across the territory (Walker and Bufkin 1986:17).

After the fashion for beaver hats declined and trapping was no longer profitable, some trappers and

mountain men hired out as guides to the United States Army. Mountain men familiar with the Gila Trail such as Kit Carson and Pauline Weaver guided military expeditions across the west and through Arizona during the Mexican War. Topographical engineer Lieutenant Emory of Kearny's Army of the West mapped the Gila Trail. A branch of the Army of the West, Captain Philip St. George Cooke's Mormon Battalion, built an alternate southern route suitable for wagon travel. (Walker and Bufkin 1986: 17, 18).

When gold was discovered in the newly acquired Mexican territory in 1848, the California Gold Rush brought a huge wave of miners *through*, not *to*, Arizona. As early as March 1848, the first gold-seekers passed through southern Arizona en route to California, a party of 25 headed by John C. Fremont (Officer 1987:221). Historians have estimated that some 60,000 miners trekked across southern Arizona between 1849 and 1851 on their way to the gold strikes in California (Sargent 1988:18). Subsequent gold and silver strikes brought a "backwash" of California miners to Nevada and the new Territories of Idaho, Colorado, and Arizona (Beck and Haase 1989:68). Because of high transportation costs and the remoteness of the strikes, prospectors concentrated on finding the most profitable metal, free milling placer gold.

In the development of the American West, the "frontier" of the miner was often distinct from the frontiers of the other settlers. Similar to the trappers who had ranged over the west in the 1830s following beavers, the miners of the second half of the nineteenth century ranged far from established settlements and military outposts in search of gold. Miners searched only for minerals, not fertile valleys or hospitable terrain. Traders and railroads followed miners, both to ship minerals out and to ship supplies in to sell to the miners.

"There Was Everything in Gila City"

The boom-bust pattern so endemic to mining settlements occurred when placer gold was discovered in Arizona Territory. First finds in 1858 were along the Gila River about 20 miles upstream from its confluence with the Colorado River at a site that soon became Gila City. In a period when the entire non-Indian population of the territory hovered around 4500 (Luey and Stowe 1987:135), some 1000 people rushed to try their luck either at placering or at selling supplies to the miners. J. Ross Browne viewed the site of the Gila City boom only six years later in 1864, and summed up the excitement in a few colorful phrases.

> Gold was found in the adjacent hills a few years ago, and a grand furor for the "placers of the Gila" raged throughout the Territory. Rumors of extraordinary discoveries flew on the wings of the wind in every direction. Enterprising men hurried to the spot with barrels of whiskey and billiard-tables; Jews come with ready-made clothing and fancy wares; traders crowded in with wagon-loads of pork and beans; and gamblers came with cards and monte-tables. There was everything in Gila City within a few months but a church and a jail, which were accounted barbarisms by the mass of the population (Browne 1864:76-77, as quoted by Officer 1989:408).

Gila City boomed from 1858 to 1859; remnants of the town disappeared in a flood in 1862.

Weaver and Walker Gold Placer Discoveries

In 1862, more placer gold was discovered, this time on the Colorado River. Quintessential mountain man, Pauline Weaver, found gold on January 12, the feast day of Our Lady of Peace; they christened the location La Paz (Granger 1960:378). Within two years, this boom attracted some 1600 inhabitants to the new town of La Paz (Sargent 1988:20). Until 1869 when the huge river shifted away from the town, La Paz was a major port on the river as well as a mining community. The much smaller nearby town of Ehrenberg, headquarters for the U.S. Army Quartermasters Corps, assumed the trading and port functions of La Paz. Ehrenberg had been named in 1866 by merchant Michael Goldwater, in memory of mining pioneer, Herman Ehrenberg (Greeley 1987:17).

Two gold placer discoveries came the next year, one at Rich Hill and one on Lynx Creek. Joseph Reddeford Walker, a guide who had served with Kit Carson, found some gold in Arizona in 1861 but chose to prospect in California first. As a 65-year old man, he returned in 1863 to Lynx Creek (south of present-day Prescott) to re-discover the placer deposits. The town of Walker grew up at the site of the gold discoveries on Lynx Creek; other discoveries were made on Turkey Creek, and Big Bug Creek. One member of Walker's prospectors was the man often credited with beginning the canal building boom in the Salt River Valley in the 1870s, Jack Swilling.

Acting on Indian accounts of gold heard in La Paz, Abraham Harlow Peeples hired Pauline Weaver as his guide. Traveling northeast out of Yuma in 1863, the party discovered gold on Rich Hill, near present-day Wickenburg. An unusual placer deposit, the gold was found on top of the hill rather than in a streambed; discovery of the deposit was credited to a Mexican in Peeples party. The traditional account describes Peeples picking up $7,000 of loose gold "before breakfast" (Greeley 1987:17). The miners also discovered nearby placer deposits in Antelope and Weaver creeks. Miners swarmed to the latest boom, erecting the town of Weaver (sometimes called Weaverville) at the foot of Rich Hill.

Lode Gold at the Vulture Mine

Also in 1863, Henry Wickenburg made the first discovery of a lode gold deposit in Arizona Territory. Earlier in the year, Wickenburg had traveled with the Peeples party and had witnessed the discoveries at Rich Hill. Striking off on his own venture, Wickenburg headed south. Some 20 miles south of Rich Hill, the well-educated Austrian geologist and mineralogist discovered an immense quartz projection containing gold. In three years, Wickenburg was one of the largest towns in the Arizona Territory and was being discussed as a possible site for the territorial capital (Sargent 1988:21). Wickenburg was short-changed in his deal to sell most of his interest in the mine, and, as was the case with many a gold speculator, he died penniless.

Gold in the Bradshaw Mountains

South of Walker's discoveries on Lynx and Groom creeks, placer gold was discovered in the Bradshaw Mountains. California gold miners William and Isaac Bradshaw came to Arizona about 1862 and operated a ferry across the Colorado River near La Paz. In 1863, William joined the Walker prospecting party in central Arizona, and gave his name to the mountains south of Prescott.

The ten-mile square Bradshaw Mining District was established in September 1864, but abandoned due to the difficulty of obtaining supplies in the remote location (Wilson 1990:13-14).

Bradshaw gold placers worked in the 1860s included those at Big Bug, Groom, Minnehaha, Placerita, Black Canyon, Granite, Eureka and Humbug regions. The "Bradshaw Diggings" were re-opened by William's brother, Isaac in 1868 and by January 1869, more than a hundred men worked the diggings. Two members of the Walker party, Charley Taylor and Jackson McCracken, along with a third man, T. G. Hogle, discovered gold about 30 miles southeast of Prescott at the Del Pasco mine in 1870; the enthusiastic Prescott newspaper dubbed it "not more nor less than the richest gold mine in the world" (Wilson 1990:17).

Work at the Del Pasco gold mine faced many of the familiar problems of remote Arizona mines. Transportation into and out of the area was difficult over the rough Bradshaw trails, and obtaining sufficient water was always a problem. The three prospectors discovered the Del Pasco gold in July 1870; by August, they had built two arrastras to mill the ore. In September, they ordered a four-stamp mill to be hauled over the primitive trails of the Bradshaws; the stamp mill made it as far as Oak Creek before winter, and was not installed and fully operational until September 1871, a year after it had been ordered. Only an erratic supply of water was available to run the mill; after two or three moderately successful wells were dug, the stamp mill operator began recycling water in order to run the mill nine hours a day. By the early 1880s, the Del Pasco mine had run out and Bradshaw miners had shifted to the Tiger, Peck, and other mines in the area (Wilson 1990:17-18).

SILVER MINING FROM NORTHWEST TO SOUTHEAST ARIZONA, 1870-1893

Post-Civil War commodity prices were high, particularly silver and copper. Prospecting for silver became more important than gold prospecting; prospectors found significant silver deposits in the Bradshaw and Cerbat mountains, at the Signal, McCracken and Silver King mines, and in Tombstone. Silver production dominated Arizona's economy in the years 1865-1893 (Nash 1987:135).

Silver in the Bradshaws

The most productive silver mines operating in the Bradshaw Mountains in the 1870s included the Tip Top, Peck, and Tiger, but they were only three of many mines in the area. Other active mines were the Tuscumbia, the Oro Belle (Oro Bella), the Black Warrior, and the Silver Prince. Both gold and silver mines in the Bradshaws were plagued by high transportation costs and scarcity of water. To lower transportation costs, mine owners in the Bradshaws invested in building roads from Phoenix and Prescott into the rugged mountains. Also, they began building their own mills, but the lack of water made it difficult to operate the mills year-round.

The Tiger silver mine was first discovered only six months after the Del Pasco gold mine; the enormity of the strike caused a rush that was compared to the earlier Comstock Lode in Nevada. In February 1871, within only a few days of the assaying of the first ore brought from the site into Prescott, there were reported to be 100 men on the steep, chaparral-covered slopes of the southwest edge of the Bradshaw Mountains. By May 1871, the Tiger Mining District was established for the

300 miners in the area; the *Weekly Arizona Miner* printed the laws of the new district. In July, the Tiger Mine consisted of two shafts, one 100 feet deep and the other 80-90 feet deep. The mine was kept open over the winter and the shafts had doubled in depth by February 1872. By April 1874, the Tiger was the first mine to be patented in Yavapai County, activity at the mine had slowed. The Tiger was re-opened in 1877; the shaft reached the 400-ft level by May 1879. A mill was installed at the mine in June 1879; bullion produced at the Tiger Mill was shipped to San Francisco. A series of difficulties beset the Tiger in late 1879. Two fatal mining accidents, a late delivery of the salt necessary for ore processing, and a series of bad checks shut down the mine at the end of 1880 (Wilson 1990:24-26, 29-31).

Edmund Peck reportedly first discovered the location of the mine that was to bear his name as he scouted for the military in the Bradshaws between 1867 and 1871; because he saw only a little gold in the ore and did not recognize the silver ore, he didn't pursue his discovery. Later, after seeing a sample of silver ore, he remembered what he had seen and returned to the site to stake a claim in 1875. By the fall of 1877, the Peck mine employed 150 men and continued to produce high quality ore, shipping $50,000 of ore each month. The town that grew up near the Peck Mine was named Alexandra (Sherman and Sherman 1969:8; Wilson 1990:32-35).

Transportation costs were always an issue for miners in the remote Arizona Territory; the high costs of transporting ore over rough or non-existent roads for processing diminished profits. In late 1875, the Peck Mine paid about $80 per ton to ship the silver ore from the mine to San Francisco for processing; the first leg of the trip through the rugged Bradshaws was the most costly, "$40 just to pack the ore to Prescott, $30 from Prescott to Ehrenberg and $10 from Ehrenberg to San Francisco" (Wilson 1990:32).

In an attempt to circumvent high shipping costs, the Peck company purchased the Aztlan mill 35 miles away on Groom Creek in March 1877, and purchased another mill to be built near the mine that same spring. This second mill had originally been ordered from San Francisco by the Black Warrior mine, also in the Bradshaws. But before the mill was installed at the Black Warrior, it was first sold to the Murat mining company on Turkey Creek, and then to the Peck Mine. The well-traveled mill included a ten-stamp mill, an attached furnace to pre-treat the ore, and a saw mill to cut lumber. A shortage of wood for fuel as well as water hampered the operation of the mill, and limited it to only half-time operation. The mine generated more ore than the mill could handle on a daily basis (Wilson 1990:34, 37).

Lawsuits among the original owners closed the Peck in 1879; settlement of those suits allowed the mine to re-open in late 1880. But water flooded the mine, and the mill re-worked the tailings through 1886. In 1886, 1889, and again in 1895, unsuccessful attempts were made to pump out the water and re-open the mine. Ed Peck died in Nogales, a poor man (Wilson 1990:51-52).

The silver lodes of the Tip Top Mine were also located in 1875, and within a year, Tip Top Camp housed 200 inhabitants. An inventory of town buildings indicates the interests of those residents; Tip Top included a grammar school, two general stores, two restaurants, a Chinese laundry, a feed yard, a blacksmith shop, a butcher shop, a shoe store, and six saloons. The mine was a bonanza for "chloriders," as the ore was located close to the surface, but the drop in silver prices in 1893 closed the mine at Tip Top (Barnes 1960:359; Sherman and Sherman 1969:151).

Mining Towns in the Cerbat Mountains

Cerbat is a Yuman word meaning bighorn sheep. The Cerbat Mountains run generally north to south, north of present-day Kingman; the Elkhart lode through the Cerbat range mixed lead, zinc, and copper with some silver and gold. Although silver was discovered here in the 1860s and a major gold strike occurred in 1900, the largest mines in the region have been the Golconda and the Tennessee, both zinc mines.

The Cerbat silver mine was located 10 miles northwest of present-day Kingman. In the 1870s, the site was reached by a long steamboat trip up the Colorado to Hardyville followed by a 38-mile ride in a stagecoach over a wagon road (Sherman and Sherman 1969:21). First discoveries were made in the area in the 1860s; the Cerbat Mine was opened in 1869 (Granger 1960:206). The town of Cerbat grew large enough by 1871 to replace Hardyville, the Colorado River port, as the county seat.

Chloride, the first mining community to be established, is the single surviving town. First opened as a mining camp in 1864, Chloride was home to 2,000 in the 1900 gold boom (Granger 1960:206; Trimble 1986:449).

Centrally located to the silver mines of the Cerbat Mountain region, Mineral Park prospered as a supply center and mill town. The townsite for Mineral Park was laid out in 1871, and by 1877 the town replaced Cerbat as the county seat (Sherman and Sherman 1969:100).

The McCracken and Signal Mines

South of the Cerbat Mountains and northwest of Wickenburg, another group of silver mines first operated in the 1870s. The McCracken (or McCrackin) silver mine was discovered in 1874 by a prospector who had been with the Walker party a decade before, Jackson McCracken. A single huge vein of silver ore produced over $6 million by 1880. Located on the Big Sandy River about 12 miles from the McCracken mine, the town of Greenwood City grew up around the stamp mill, housing about 400 people in 1876 and "two of the nicest saloons in the country" (Sherman and Sherman 1969:72).

The Signal silver mine was "one of the most famous of its day" (Granger 1960:223). The town of Signal, about nine miles from both the Signal and McCracken mines, contained a mill used by both mines. The town sprang into being quickly; within eight months after construction of the mill was completed in 1877, the town contained 800 residents and 200 buildings, including its own brewery. Famous Tombstone prospector Ed Schieffelin brought his silver ores north to Signal to be assayed; interest in his strike sent many miners from Signal south to the Tombstone boom (Granger 1960:223).

Silver King and Stonewall Jackson

Arizona's "Silver Belt" in southern Gila County and nearby portions of Pinal County produced millions of dollars of silver in the 1870s. Although the town of Globe was named for the discovery

of a large, almost pure silver nugget which resembled a globe, silver was mined there for only a few years in the late 1870s. The vast copper deposits of the area soon overwhelmed the earlier silver mines. More important silver discoveries in the vicinity of Globe were the Silver King and Stonewall Jackson mines.

Silver was first discovered at the Silver King location by one of General George Stoneman's soldiers constructing a road from Camp Picketpost into the Pinal Mountains in 1873. Sullivan, the soldier, showed off his collection of black metallic rock to his companions but would not tell them the location of his find. In 1875, a party of five farmers were attacked by Apaches on a return trip from the mines in Globe; one was killed. The survivors took the body to be buried at an old camp of General Stoneman. One of the party, Isaac Copeland, chased a stray mule and tripped over an outcropping of silver that was later identified as Sullivan's find (Sherman and Sherman 1969:142).

Within six months, fifty men brought 30 tons of ore out of the Silver King mine each month; over nine years, the Silver King produced over $6 million in silver. Because of the greater water supply available along Queen Creek, the stamp mills were built at Picket Post, later known as Pinal. After milling, ore was shipped to San Francisco for processing. The Silver King mine began to decline in the late 1880s; the drop in silver prices in 1893 diminished profits. After the turn of the century, the mine was acquired by the Magma Copper Company (Haak 1991:33).

Prospectors Charles McMillan and Theodore Harris located silver ore north of Globe in 1876, and dubbed their mine the Stonewall Jackson. Repeating a familiar story, hundreds flocked to the latest strike and a town, McMillanville, sprang up quickly. In 1879, a five-stamp mill was shipped in from Silver City, New Mexico, and soon replaced with a twenty-stamp mill. By 1880, the population of McMillanville reached 1,500-1,700, the second largest camp in the Arizona Territory. Curiously, the strike was located within the San Carlos Apache Indian Reservation, but the power of silver convinced the federal government to extract the 12-mile wide strip of land containing the mines from the reservation.

But the silver played out quickly; the post office and last business closed in 1882. In 1890, only one resident remained in town. "Uncle Charlie" Newton had worked with McMillan and Harris from the first years of the Stonewall Jackson and believed until his death in 1928 that he would find another great silver strike in the area (Granger 1960:108; Haak 1991:34-35; Sherman and Sherman 1969:95).

Water Strike in Tombstone

The "most famous boom town in the mineral west" based its boom on the discovery of silver in Arizona (Cook 1987:229). Prospector Ed Schieffelin found silver in the high desert of southeastern Arizona in 1878, calling his claim, "Tombstone." By the 1880 census, the population in the remote desert location had jumped to 973. An unofficial estimate placed the 1880 population at 5,000 (Cook:1987:229). As word of Schieffelin's rich strike spread in the early 1880s, the population boomed, and the silver mining town became the largest town in Arizona Territory during 1882-1884 when the population has been estimated at 10,000 (Sargent 1988:44) and as high as 15,000 (Granger 1960:54).

The irony of the Tombstone silver bonanza was the scarcity of water above ground compared to the overabundance of underground water. During the first year of the boom, mules carried drinking water from the small spring at Watervale (about two miles east) to the new settlement of Tombstone. Soon, a more efficient system brought water pumped from Sycamore Springs, about 10 miles north of town; a tank-equipped wagon replaced the mules. However, the milling process required a much greater volume of water than could be carried by both mules and wagons. In 1882, the Huachuca Water Company built a series of catch basins in the Huachuca Mountains and pumped water 21 miles east to Tombstone to serve both the residents and the mills at Charleston and Contention City.

Below ground, the problem was too much water. In 1882, the same year the Huachuca Water Company provided water to Tombstone with its 21 miles of pipeline from the Huachuca Mountains, as miners reached the 500-foot level, they "struck" water. The mines were closed temporarily to allow installation of huge Cornish water pumps to pump out the water collecting in the subterranean levels of the mines. Harvesting wood to fuel these huge pumps, capable of pumping four million gallons of water each day, stripped the woodlands around Tombstone. The pumping system worked well until 1886 when underground fires destroyed some of the pumps, and the mines filled with water.

The Tombstone mines remained filled with water for fifteen years. After the turn of the century, E. B. Gage had purchased and consolidated many of the mines in the Tombstone District as the Tombstone Consolidated Mines Company, and built five new water pumps. The new machines pumped 10 million gallons of water each day up from the subterranean mines and poured the water into Tombstone and Walnut gulches. With these new pumps, the Tombstone mines operated until 1909 when they were closed by a combination of a decline in the price of silver, a strike by the miners, and a tank car containing salt water instead of fuel. When the salt water flowed into the fuel tanks of the boilers, the boilers were destroyed and the pumps quit working (Cook 1987:232).

Despite the troubles with water, the Tombstone silver mines produced legendary amounts of silver, along with gold, copper, lead, and zinc (refer to Table 1-3). One attempt to convert nineteenth century dollars into contemporary values estimated the $40 million produced from the Tombstone mines would be worth $1.7 billion today (Cook 1987:232).

NEW PROCESSES AND A SECOND GOLD BOOM IN WESTERN ARIZONA, 1890-1917

Many reasons underlay the new gold boom in Arizona in the last decade of the nineteenth century. First, the continuing fascination with Western gold mines brought new investment money to Arizona in the 1880s and 1890s, providing new capital to develop the expensive lode gold mines. The money came from many sources, including Midwestern bankers, English investors, and nearly every territorial governor of Arizona between 1889 and 1923 invested in Arizona gold mines. With the precipitous drop in silver prices in 1893, the price of gold rose; also, the newly developed cyanide process extracted gold from ore more profitably. Miners returned to prospecting for gold (Spence 1958:241-267; Spude 1991: footnote 58).

Major discoveries of gold, primarily lode deposits, were made in the Bradshaw Mountains of Yavapai County, and the desolate reaches of Mohave and Yuma counties. Construction of new railroads,

electric dynamos, and telephone lines transformed these gold mining settlements from the isolated, primitive camps of twenty years earlier. More than 400 gold operations existed across the state at the turn of the century (Spude 1991:177).

New Capital in the Bradshaws

Lode gold mining in the Bradshaws became important with the workings at the largest mine in the district, the Crowned King (later, Crown King) Mine in the 1890s. Under the management of Illinois banker-turned-mine-manager George Harrington and store-owner-turned-mine-owner Noah Shekels, the 650-ft mine profited. The two partners incorporated several of the newest technological advances such as cyanide processing of the gold ore, electrification of both the mine and the town after 1894, and railroad transportation. The 1899 construction of the Prescott and Eastern Railway into Mayer, and the Bradshaw Railway from Mayer to Crown King in 1904, reduced transportation costs. Harrington and Shekels also re-opened several twenty-year old mines in the Bradshaws, including the Tiger, Oro Belle, and Wildflower mines (Spude 1992:153-182; Wilson 1990:57-58; Wilson and others 1967:56).

Two names that appear and re-appear in Arizona mining are Frank Murphy and E. B. Gage. Joint owners of the Congress Mine from 1891-1910, the two men eventually moved south to re-open the Tombstone mines after the disastrous floods of the 1880s. Murphy's influence in the Bradshaw Mountains was widespread. His persuasions enticed Senator Clark of Montana to purchase a copper mine in Jerome; Clark later established the mill town below Jerome that bears his name, Clarkdale. Murphy convinced Diamond Jim Reynolds to purchase the Congress Mine in 1887 and allow Murphy to manage it. After Reynolds' death in 1891, Murphy and three others bought the mine. Murphy and his associates bought the Poland silver and lead mine in the early 1890s and operated it until 1913. He also owned interests in the Wildflower, Crown King, and Tiger mines of the Bradshaws (Coggin 1991:111-113).

In addition to managing and owning mines, Frank Murphy worked to build railroads connecting those mines to mills, smelters, and markets. To service the Congress Mine, Murphy envisioned a railroad line connecting Ashfork to Prescott and Phoenix; the Santa Fe, Prescott and Phoenix Railway was completed in 1895. The Prescott and Eastern Rail Road connecting Prescott to Mayer (completed 1898), and the Bradshaw Mountain Railway from Mayer to Crown King (completed 1904), were built primarily as mining railroads to move ore from the mines to mills in the Bradshaws and the smelter at Humboldt (also owned by Murphy and his associates).

In other business dealings, Murphy and his associates owned the *Arizona Republican* Phoenix newspaper from 1898-1909, the Castle Hot Springs resort north of Phoenix, and was a founder and president of Prescott National Bank (Coggin 1991:112-116).

Gold in Western Arizona

Not all of the new gold boom concentrated on re-working known deposits. The lone prospector with his burro continued to prospect the desolate reaches of Arizona and found pay-offs in the rich

discoveries of the King of Arizona, Fortuna, and Harquahala Mines in the deserts of western Arizona.

The King of Arizona, or KOFA, mine was discovered in 1897 by Charles Eichelberger who

> had packed some burros up from Mohawk and decided to go into the canyon that headed at the King vein to try and locate a water tank for his animals in order to be able to prospect that section. An old Indian trail went over the mountain and going up this trail he discovered a small cave, an overhanging rock where the evidence showed that the Indians cooked there. He sat down under the shade as it was fairly warm. Where the smoke covered the wall he noticed some bright yellow spots--gold--and found he was right on the best portion, as proved later, of the whole vein. He located a group of claims and he and his partner, a Yuma businessman who had grubstaked him, sold for $250,000 (Keiser 1984:97).

Finding a water supply at the desert location was a problem. Drinking water was hauled in used wine and whiskey barrels on the backs of mules; the 35-mile trip from Mohawk on the Gila River took two days. A groundwater supply was discovered at a depth of 1,000 feet, five miles south of the mine in 1897; the discovery prompted the mining company to construct an on-site mill and cyanide plant. The KOFA lode gold mine operated until 1910, producing over $3.5 million in gold ores as well as some silver and small amounts of copper and lead (Sherman and Sherman 1969:88).

Life as a hardrock gold miner was not luxurious. Often, lodging was a simple "tent house" on the desert. Work in the tunnels was described by one man as he quit working for the KOFA.

> I was really glad to quit that tunnel. I thought of what use is the money if I ruin my health and I felt sure Billy Horan was killing himself going back of the muck pile and breathing that powder gas. I know it affected me, for I often had headaches, and Doc Frazier's pills did me no good. "If Billy doesn't watch out, he will be buried here." I was a better prophet than I knew, for he died after I was at Quartzsite and was buried at the King. I was told he actually had turned yellow before he died. His lungs were burned out, I guess (Keiser 184: 106).

Eichelberger, the prospector who had discovered the rich gold veins of the KOFA Mine bought a laundry in San Francisco with his portion of the profit; the uninsured business burned to the ground in the 1906 earthquake and fire (Keiser 1984:97).

South of the Gila River in the Yuma Desert southeast of present-day Yuma, the Fortuna Mine and the associated town of La Fortuna boomed in the 1890s after a new discovery of gold in 1894. Ironically, the golden riches of the Fortuna were only a few miles south of the Camino del Diablo, the route across southern Arizona taken by thousands of California-bound gold seekers.

As in other Arizona desert mining locations, water was scarce. The La Fortuna Gold Mining and Milling Company solved the water problem by constructing a large water pump on the Gila River and pumping water to the mine and town. The mining camp housed 80-100 men and their families in wooden frame houses, adobe huts, and tents, and operated actively for about 10 years (Sherman and Sherman 1969:56; Baker 1980:6-9).

Spanish prospectors first identified the gold riches in the Harquahala Mountains as early as 1762, and, in 1814, returned to the area for a second unsuccessful attempt to mine the gold. Henry Wickenburg had been on his way to prospect in the Harquahala Mountains when he discovered the Vulture gold deposits near Wickenburg. A Pima Indian was reported to have located the gold here in 1869. The gold lodes of the Bonanza and Gold Eagle veins in the Harquahalas remained unexploited until 1888. After discovery of the gold about nine miles south of Salome, the area was filled with the usual suspects of miners, saloon keepers, and merchants (Sherman and Sherman 1969:75).

An innovation in shipping gold bullion began at the Harquahala mines when one of the engineers suggested casting the gold into 400 lb. bars. The assumption was that these large bars would be much harder to steal than the standard roughly one-pound bars. Harder to steal, yes, but also harder to transport. The Harquahala mines were worked intermittently from the 1890s into the 1960s, producing gold, silver, and lead (Sherman and Sherman 1969:75).

Congress and Octave

After Dennis May discovered gold 19 miles north of Wickenburg in 1884, the Congress gold mine and town was developed first by "Diamond Joe" Reynolds from 1887-1891 and, after his death, by a four-man partnership including Frank Murphy and E. B. Gage. By May 1891, the Congress was Arizona's largest gold mine, producing nearly $8 million in gold from 1891-1910. The site boasted most of the modern conveniences, including a cyanide processing plant and railroad access by 1894 (at Congress Junction, three miles away), telegraph and telephone connections, and an electrical plant. What it lacked was water. In 1398 and again in 1900, fire destroyed several wooden buildings in town, a familiar story in Arizona mining communities. President McKinley visited Congress in May 1900. By 1905, 500 people lived in Congress; the town remained active until 1938 (Sherman and Sherman 1969:36-39; Rabb and Chase 1987:132).

Sources disagree on the location and founding date of Octave, located near Rich Hill, but agree on the meaning of the name. Whether the settlement was laid out as a placer camp near Weaver in 1863, or set up at the site of Weaver in the 1890s to re-work the old site utilizing the new cyanide process, it seems to have been established by the eight men of the Octave Gold Mining Company. One of the first cyanide processing plants in Arizona was built at Octave in 1899, along with a 40-stamp mill; the combination produced $2 million in gold before the plant closed in 1910 or 1912. Both Octave and Weaver were included in the Rich Hill Mining District which produced gold, silver, lead, and copper until 1970 (Barnes 1960:352; Keith and others 1983:44; Sherman and Sherman 1969:109).

The Greatest Gold Mines in Arizona

In the Black Mountains of western Mohave County, about 20 miles east of the Colorado River and about the same distance southwest of Kingman, the Oatman district produced the three greatest gold mines in Arizona: the Gold Road Mine opened in 1899, the Tom Reed Mine in 1908, and the United Eastern Mine in 1913. Nearly two million ounces of gold and over one million ounces of silver were shipped out of the Oatman District between 1870 and 1980; the ores were unusual because they were

intermingled with very little copper, and almost no lead and zinc (Goudy 1987:153-176; Keith and others 1983:38).

Although both the Gold Road and Tom Reed discoveries brought a boom town climate to Oatman, the development of the United Eastern mine swelled the population from about 30 in 1916 to 5,000 a year later and 10,000 in 1924. The unpaved main street of town snaked along the bottom of a twisting canyon, with residences clinging to the sides of the canyon. The main street (later a segment of U. S. Highway 66), jostled with both automobiles and mule teams. Despite the heat and the dust, life in the tent houses of this early twentieth century boom town has been described as comfortable (Figure 1-11).

> Everyone had a job, wages were good and the town was safe. There was little crime, other than some drunkenness. Many of the people lived in tent houses. These houses usually had walls of all or part canvas. Some had tin roofs, while others had canvas roofs stretched over beams. Some of these tent houses were quite nice. The Douglas family had linoleum floors, green burlap covered walls, bookcases full of books, a Victrola and a piano. Their house had a grape arbor across the front for shade to help cool the olla water and the inhabitants (Goudy 1987:153).

Because Oatman was not located on either the river or the railroad, goods had to be freighted in from Kingman. Water was freighted into town from the wells at the Tom Reed Mine until an expansion of the stamp mill there demanded more water. To supply both the 20-stamp mill and the town, water was freighted in from another mine in the area, the Times Mine (Goudy 1987:155).

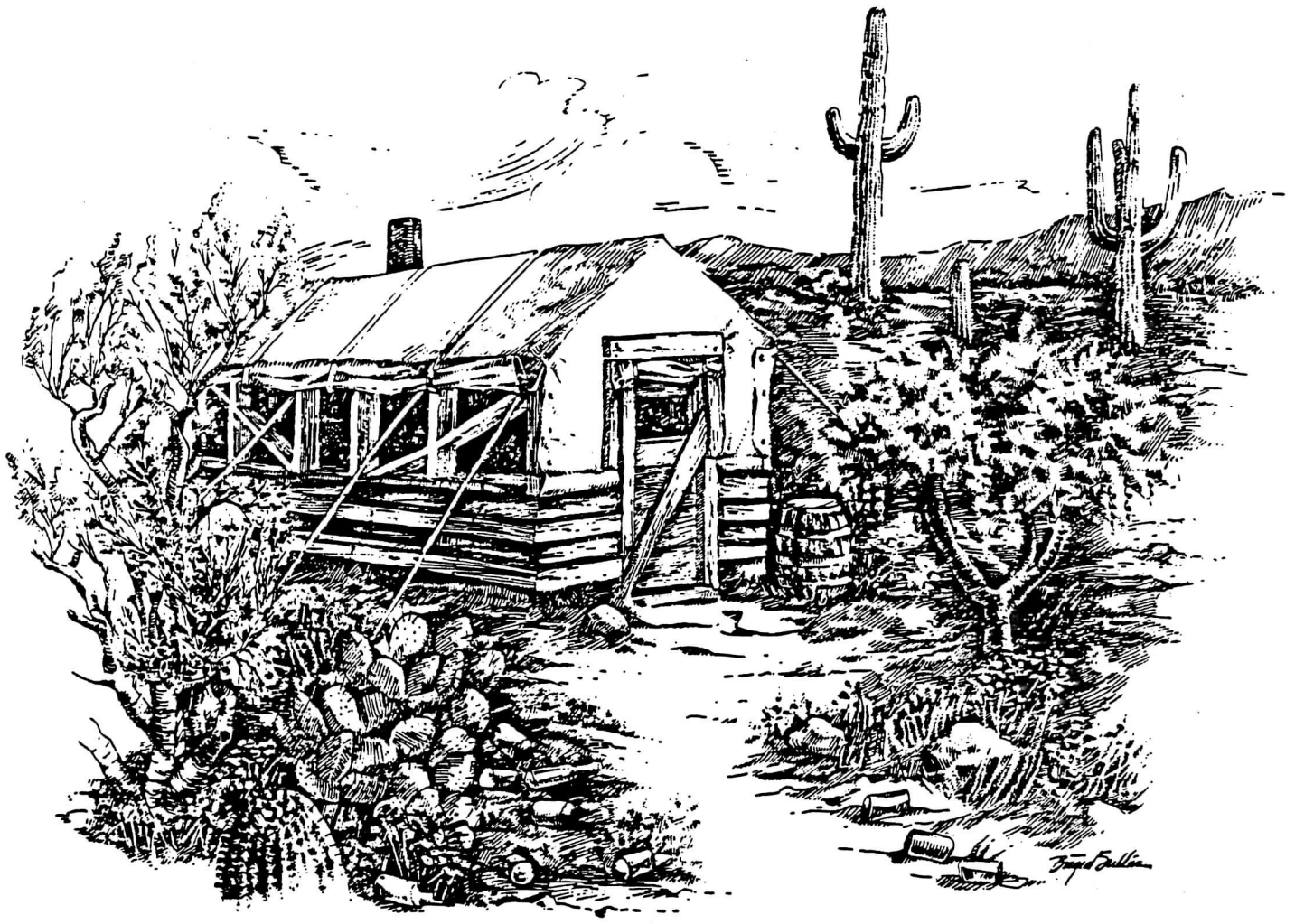
The boom at the United Eastern lasted until the mine was closed in 1926 when the cost of processing the ore outstripped profits. The Tom Reed Mine opened another large vein in 1930 and it was worked until 1942 when the United States government ordered all gold mines to be closed, as gold was considered a "non-strategic" mineral. The town of Oatman remains today as a ghost town and site of some of the scenes from Hollywood's "How the West Was Won" (Goudy 1987:155; Nash 1985:7, 21; Sherman and Sherman 1969:106-108).

SECONDARY GOLD AND SILVER MINING, 1900-1942

As the nineteenth century came to a close, the price of copper climbed. Copper mining boomed and as early as 1888, the value of copper production surpassed the value of gold and silver mined in Arizona Territory. In the twentieth century, most of the gold and silver produced in Arizona has been as by-products in the smelting and electrolytic refining of copper (refer to Table 1-2) (Nash 1987:135; Wilson and others 1967:18).

But gold fever seems never to disappear. During the Great Depression, a gold rush much smaller in scale than the California Gold Rush took place as hopeful miners re-worked nineteenth century placers, hoping to glean gold from the deposits. A contemporary source indicated that some of these gold panners made approximately $0.50 per day for their efforts, only enough to cover basic expenses (Wilson 1933:20, 32, 38).

But the world war would bring gold speculation to an end, temporarily. In 1939, Congress enacted the Strategic Minerals Act which authorized the U. S. Bureau of Mines and the U. S. Geological Survey to accelerate prospecting for "strategic minerals" necessary for the national mobilization program. Copper, iron, tin, tungsten, zinc, chrome, bauxite, and other more exotic minerals were defined as "strategic;" silver and gold were not included on the list. And in 1942, U. S. government order number L208 closed all the gold mines in Arizona (Goudy 1987:155; Nash 1985:7, 21, 30).



Sketch of an Arizona Miner's Tent, circa 1900 **Figure 1-11**

(Source: Teague 1980: frontispiece)

CHAPTER 2
HISTORIC GOLD AND SILVER MINING PROPERTIES IN ARIZONA

> [Miners] occupied not fertile valleys or rich farmlands but often the unattractive portions of the Far West--steep mountainsides where roaring creeks covered deposits of precious metal, parched deserts where shifting sands hid beds of ores, and highlands where jagged rock outcroppings shielded mineral-bearing lodes. The prospectors scoured thousands of square miles of mountain and desert that would have been avoided had farmers been the only pioneers (Billington and Ridge 1982:556).

This chapter focuses on the tangible remnants that reflect the history of gold and silver mining in Arizona. It is intended to be a "taking stock" of where we stand, and also to provide some perspective for evaluating the significance of historic properties related to gold and silver mining.

In the jargon of preservation planning, historic "property types" must first be defined, then the patterning of the spatial distribution of these various property types should be considered, and the condition of inventoried examples of property types should be characterized. Such baseline information provides a foundation for identifying information needs, which we then use to formulate preservation issues and recommend strategies for preservation planning, the subject of Chapter 3.

PROPERTY TYPES

The stereotypical prospector worked alone. Traveling with his mule, gold pan, and pickaxe, he searched stream beds for gold placers and quartz outcrops for lode gold. After staking a claim, he returned to town to either sell his claim or to find the capital to build the complex workings for a hard rock mine. Mining lode gold and silver embedded in rock required many laborers and much equipment, and the towns often moved to the mines. So, to understand the silver and gold mining property types, one must revise the stereotype to include many more people, industrial facilities, and substantial capital investment.

In 1991 the National Park Service issued draft *National Register Bulletin 42* to provide guidance for evaluating and nominating historic mining sites. The *Bulletin* points out that mining activities can be reflected in a bewildering array of property types of varying sizes and functions. The *Bulletin* suggests that the potential diversity of property types can be organized by understanding the mining process and using that as an organizational basis for classifying property types. By adopting this strategy we suggest that mining related properties can be classified into three major groups: (1) extraction sites, (2) processing sites, and (3) associated habitation and commercial facilities (Table 2-1).

Extraction Properties

Draft *Bulletin 42* identifies two major classes of extraction properties: (1) exploration sites, and (2) development and production sites.

Exploration sites reflect initial phases of searching for ore. They may consist of small simple hand excavated prospect pits, dug by the proverbial lone prospector, to trenches excavated by hand or by machine, or more elaborate shafts and adits excavated or blasted into hard rock. These might often be accompanied by claim markers, which commonly are cairns of rock with or without posts and occasionally with claim papers still intact inside containers such as tobacco cans. The maximum size of a lode claim in the U.S. is 600 by 1,500 ft, and markers were typically erected at the corners and in the center. Maximum placer claims were somewhat smaller at 600 by 1,320 ft (1/4 mile). Prospects that did result in major discoveries may very well have been obliterated by subsequent mine development.

Mine development and production sites will vary greatly depending on the types and extent of mining pursued. Placer mines are likely to leave distinctively patterned debris piles of washed gravels (discernible to the trained eye), and usually will indicate whether simple wet sluicing, pressurized hydraulic mining, or dredging was pursued to recover placer gold. Surface or near surface mining of chloride ores will be evidenced by open trenches or surface pits following veins of ore, or perhaps shallow adits and shafts. Substantial underground hardrock mines are like icebergs with many of their components being out of sight, but nevertheless required a variety of facilities on the surface.

Lode or hardrock mining sites are likely to be indicated by the shafts and adits excavated to recover ore. There may be other shafts for air vents, perhaps remnants of blowers, and maybe other adits for drainage. Evidence of hoisting works, such as headframes or whims, and remnants of buildings that housed hoist engines may also be present. There may also be remnants of systems for transporting ore on the surface, such as tramways or light rails for ore carts. Power systems might be evidenced by remnants of facilities for steam boilers or electric generators. Buildings, foundations, or artifactual debris could indicate the location of maintenance facilities, such as blacksmith shops. Many production mines may also have had equipment storage and administration buildings. Most hardrock mines are also likely to have piles of waste rock. Discarded tools and equipment, and other architectural debris also may be scattered across the surfaces of most development and production sites.

Processing Properties

Placer gold and the rarer placer silver are often referred to as free or native metals. Although such placers usually are not absolutely pure, they did not require elaborate concentrating and refining techniques. Sometimes mercury amalgamation was used to capture finer particles of placers in sluices or to clean the deposits trapped in sluice boxes.

Most ores required substantial "benefaction" to separate ore from waste rock and increase the concentration of precious metal. An initial processing step typically involved crushing the ore into gravels or sand. The simplest method was cobbing, which involved breaking rock with hammers and sorting out the richest ore by simple inspection. Arrastras represent a slightly more advanced technique of using animal power to pulverize ore (refer to Figure 1-8). Once reduced to gravel or sand, the ore might then be panned or sluiced as placers were, or amalgamated with mercury or the patio process might have been used for silver ore. Retorting (vaporizing) the amalgam drove off the mercury and left the gold and silver behind.

TABLE 2-1
Historic Gold and Silver Mining Property Types*

1 ***Extraction Properties***
- **Exploration**
  - prospect holes, shafts, and adits
  - claim markers
- Development and Production
  - placer mines
  - hard rock mines

2 ***Processing Properties***
- milling (for example; arrastras, stamp mills)
- smelting and chemical benefaction and refining

3 ***Associated Habitation and Commercial Properties***
- camps
- boom towns

* Many more specific property types might be encountered, and many of the generic property types may be present in various combinations at single localities.

Stamp mills (and later ball mills) represent an innovation for increasing the rate of crushing ore. The earliest stamp mills may have used animal power but they typically depended on steam power to drive the stamps that crushed the ore. Chloride ores (oxidized because they were at the surface or near the surface) could be milled and then amalgamated to recover the free-milling gold and silver.

More than 50 chemical processes were developed to extract gold and silver chemically bound in sulfide ores (deeper than chloride ores and not oxidized). Many of these processes involved smelting or heating the ore, often in the presence of various fluxes, to chemically separate and concentrate the metals from the unmineralized rock. The ovens or furnaces used for smelting varied from simple adobe structures to elaborate furnaces of fire brick, and more mobile water jacket furnaces. Kilns used to make charcoal are sometimes associated with smelters. The matte or *dore* that resulted from such processing was then shipped to other facilities for final refining into bullion suitable for commercial exchange or industrial use. Much of the final refining of Arizona gold and silver was done in places such as San Francisco and El Paso.

Processing sites, therefore, can vary from simple arrastras to large complex milling, smelting, and refining plants. The equipment and facilities installed in such processing plants typically had use lives longer than that of the mines themselves, and hence often were salvaged and moved to new facilities, or were salvaged for scrap metal in World War I or World War II. Therefore, abandoned milling and smelting sites are unlikely to remain intact. Some historic mines may have standing buildings, but the equipment is unlikely to remain and many processing facilities have been reduced to archaeological remnants of building foundations. In addition to building foundations, tailings and piles of slag are likely to remain and can provide clues for identifying processing sites.

Associated Habitation and Commercial Properties

Exploration, extraction, and processing sites are typically associated with camps or towns where miners resided. These may have been extremely temporary camps occupied for a few days to substantial towns that "boomed" briefly, but ultimately proved to be only temporary communities. Others may continue to be occupied. The nature of the habitations in these sites varied substantially. Tents and tent houses were common in the most temporary camps, and even in some of the more permanent camps and towns. Simple frame buildings also were common, but elaborate architecture, such as the residence of a mine owner or commercial properties in associated towns, could survive in some settings. Other related features might include road and rail transportation systems.

Location and Design of Properties

As draft *Bulletin 42* points out, exploration, development and production, processing, and associated habitation sites may each occur in distinct locations, but sometimes the facilities were clustered together. More recent facilities are likely to be engineered and may include quite orderly and efficient arrangements of mines, mills, smelters, ore storage and waste rock and tailings areas, support facilities, and habitation areas. The design of such engineered properties should not be overlooked. In addition, some historic properties may be situated and preserved so as to form dramatic landscapes, and the historic values of such settings warrant special consideration.

A SAMPLE OF INVENTORIED PROPERTIES

The lack of a centralized file of archaeological and historical sites for the state complicates the compilation of information regarding inventoried sites related to gold and silver mining. To provide some indication of the numbers of historic gold and silver mining sites that have been recorded, we searched the computerized AZSITE system maintained by the Arizona State Museum, the informal state inventory at the State Historic Preservation Office, and perused relevant technical reports.

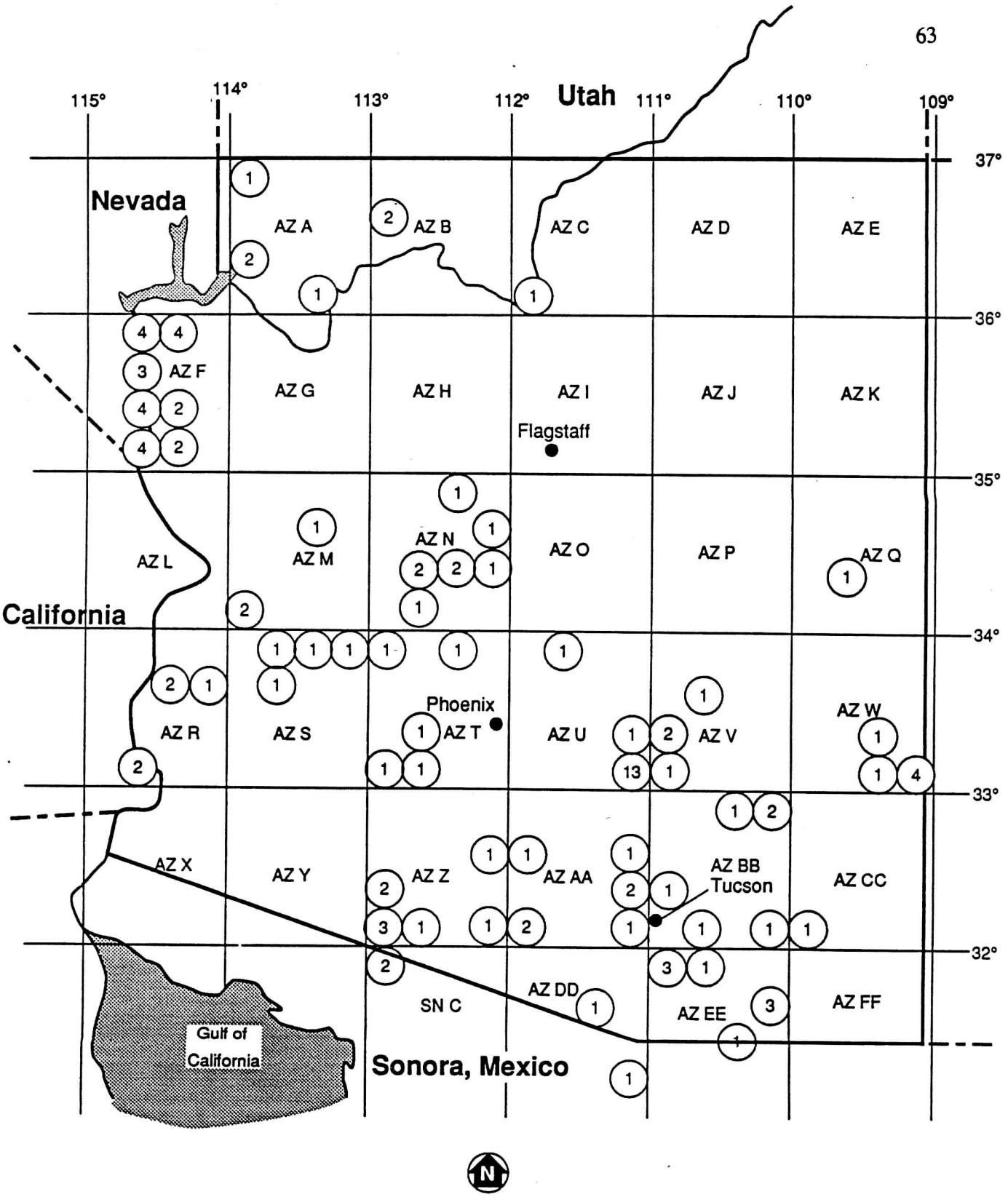
Properties Listed on the AZSITE System

The AZSITE database maintained by the Arizona State Museum in Tucson has information on some 21,000 archaeological and historical sites that have been recorded over the past several decades. The database was originally developed for prehistoric archaeological sites and is dominated by such sites. The AZSITE files probably constitute at least the majority of archaeological and historical sites recorded in the state, but substantial other files are maintained by the State Historic Preservation Office [the SHPO files are discussed below], universities, museums, agencies, and other research institutions. Hence, it must be recognized that the following analysis is based on sample data rather than a complete inventory.

We searched the AZSITE files to identify all sites that included within the field of information called "features" the label "mine." Clearly, other sites related to historic gold and silver mining may have been coded with other labels, such as "camps" or "town-village," but searching by such common code words undoubtedly would have generated vast lists dominated by sites with no associations with mines. Our search of the database identified 115 sites.

A plot of the locations of these 115 sites on a map of Arizona reveals a not unexpected pattern that follows the broad band of mineral deposits running from northwest to southeast across the state (Figure 2-1). Forty-two of the sites were identified by named mines (Table 2-2), but a comparison of this list with Table 1-1 and Table 1-3 demonstrates that many of the historically important gold and silver mines in Arizona have not been recorded as historic sites. Of the "top ten" gold and silver mining districts in Arizona, only the Old Vulture, Pioneer (Superior), and Copper Mountain mines were identified in the AZSITE database. Of course, there may be no historic remnants of many of the more famous mines, but the lack of correspondence is probably more a reflection of the fact that many gold and silver mining sites that have been inventoried were incidentally identified by surveys that did not specifically target mining sites.

The AZSITE files contain relatively little information about most of 115 identified sites. For example, only 11 of the 115 sites could be specifically identified as being related to the mining of gold or silver. The ores prospected for or mined from 82 percent of the sites was not indicated (Table 2-3). Although the identification of mined ores is an important characteristic for understanding the history of a mining site, there are multiple reasons for difficulty in identifying them. First, as pointed out in Chapter 1, several minerals may be mined from a single location due to the polymetallic nature of ores. Second, much of the technology and machinery used to mine lode gold and silver is similar to that used for copper and lead or other metals and minerals, and may be indistinguishable at an archaeological site. Third, much of the mining machinery may have been



Identified Archaeological Sites Related to Mining in Arizona **Figure 2-1**
(Source: Arizona State Museum AZSITE Data Base)

TABLE 2-2
Historic Mines Identified as Archaeological Sites in Arizona

Site No.	Mine Name	County	Other Information
AZ A:9:6 (ASM)	Savannic Mine	Mohave	
AZ A:9:7 (BLM)	Cunningham Mine	Mohave	
AZ A:15:33 (ASM)	Copper Mountain Mine	Mohave	
AZ C:13:20 (ASM)	Grand View Mine / Last Chance Mine / Canyon Copper Co. Mine	Coconino	Stone and adobe structures present
AZ F:2:60 (ASM)	Two B's Mine	Mohave	
AZ F:11:6 (BLM)	Pilgrim Mine	Mohave	Historic gold/silver mine
AZ F:14:105 (ASM)	Katherine Extension / Katherine Mine	Mohave	
AZ M:13:11 (BLM)	Swansea Mining Townsite	La Paz	Historic mining town
AZ N:11:11 (ASM)	Senator Mine	Yavapai	
AZ N:11:13 (ASM)	Poland Mine	Yavapai	Tunnel
AZ Q:10:4 (ASM)	Old Hackberry Mine	Mohave	
AZ R:14:29 (BLM)	Papago Mine	La Paz	Habitation and artifact scatter
AZ R:14:32 (BLM)	Clip Mine	La Paz	Habitation areas, refuse, and wagon road
AZ T:1:1 (ASM)	Old Vulture Mine	Maricopa	
AZ T:3:59 (ASM)	Humbug Mine	Maricopa	Hydraulic mining complex
AZ U:2:5 (ARS)	Uranium Mine	Maricopa	
AZ U:12:2 (ASM)	Camp Pinal	Pinal	Pinal City and Silver King Mine
AZ V:6:2 (ASM)	Stonewall Jackson Mine	Gila	Pottery present
AZ V:9:4 (ASM)	Dominion Mine	Gila	Historic copper mine
AZ V:9:8 (ASM)	Pioneer Silver Mine	Gila	
AZ V:13:10 (ASM)	Troy Copper Mine	Pinal	
AZ V:14:1 (ASM)	Christmas Mine	Gila	
AZ Z:8:3 (ASM)	Vekol Mine	Pinal	
SN C:1:6 (ASM)	Milton Mine	Pima	
SN C:1:14 (ASM)	Victoria / La Americana Mine	Pima	Cistern and stone building
AZ Z:13:38 (ASM)	Growler Pass	Pima	Papago plain ceramics present
AZ Z:13:39 (ASM)	Bates Well	Pima	
AZ Z:13:48 (ASM)	Growler Mine Area	Pima	
AZ Z:14:18 (ASM)	Gunsight Mine	Pima	Founded November 25, 1878
AZ Z:16:19 (ASM)	Brownell Mine	Pima	
AZ AA:5:16 (ASM)	Jackrabbit Mine	Pinal	
AZ AA:12:496 (ASM)	Gould Mine	Pima	Five mine shafts
AZ AA:13:1 (ASM)	Picacho Mine and Trading Post	Pima	
AZ AA:13:14 (ASM)	Silver Queen Mine	Pima	
AZ BB:4:9 (ASM)	Spenazuma	Pima	Town, mill, and two gold mines
AZ BB:16:12 (AMF)	Lamphier Mine	Cochise	House and associated trash dump
AZ CC:13:9 (ASM)	Golden Rule Mine	Cochise	
AZ DD:7:11 (ASM)	Cerro Colorado / Heintzelman Mine	Pima	Old silver mine 1857
AZ DD:16:1 (ASM)	Planchas de Plata	Sonora	
AZ EE:1:80 (ASM)	Helvetia	Pima	
AZ EE:1:81 (ASM)	Greaterville	Pima	1874-1881
AZ EE:2:49 (ASM)	Rosemont / Old Rosemont	Pima	

Source: Arizona State Museum AZSITE Data Base

TABLE 2-3
Summary of Identified Archaeological Sites
Related to Mining in Arizona

Mining Sites	
Sites Related to Gold Mining	6
Sites Related to Silver Mining	5
Sites Related to Copper Mining	10
Specific Metal Not Indicated	94
Total Number of Sites Related to Mining	115 *
National Register Status	
Mining Sites Listed On NRHP	7 **
Mining Sites Probably Eligible for NRHP	9
Mining Sites Probably Not Eligible for NRHP	10
Mining Sites Not Eligible for NRHP	2
Mining Sites With NRHP Status Not Indicated	87
Total Number of Sites Related to Mining	115

* Total number of sites related to mining was obtained by accessing the AZSITE database and selecting all site records which contained the label "mine" in the indexed field "feature". The standard AZSITE summaries were then displayed for those sites that were selected. These sites represent about 0.5 percent of the approximately 21,000 sites in the AZSITE database.

** Sites listed on the National Register are:

1. AZ C:1:6 (ASM) Milton Mine, Lukeville vicinity (copper)
2. AZ C:13:20 (ASM) Grandview Mine, Grand Canyon vicinity (copper)
3. AZ N:11:13 (ASM) Poland Tunnel/Mine (silver/lead)
4. AZ Z:13:48 (ASM) Growler Mine, Lukeville vicinity (lead)
5. AZ AA:12:496 (ASM) Gould Mine, Saguaro National Monument, listed as part of a district [In Tucson Mountains Historic Mining District?]
6. AZ EE:1:108 (ASM) unnamed mine, listed as part of a district [Empire Historic Mining District?]
7. SN C:1:14 (ASM) Victoria/La Americana, Lukeville vicinity (silver)

Sources: Arizona State Museum AZSITE Database

hauled away when a mining site was abandoned leaving few clues.

The information in the AZSITE files is so limited that we were unable to classify the sites into property types. The AZSITE database also indicated that the significance of less than eight percent of the 115 mining sites has ever been formally evaluated. Only seven of the sites were identified as being listed on the National Register of Historic Places, and only one is a silver mine, the Victoria/La Americana Mine (refer to Table 2-2 and Table 2-3). None of the National Register listed properties are identified as gold mines.

Properties Listed on the National Register of Historic Places

To supplement our sampling of the AZSITE database, w also reviewed the Arizona listings on the National Register of Historic Places. We were able to identify only thirteen sites with any relation, however peripheral, to gold and silver mining that have been listed on the National Register; these represent less than one percent of the 950 Arizona properties listed through June 30, 1991 (Figure 2-2). Only one of the listed properties, the Lynx Creek District, is a well-known gold placer area. The nomination under preparation for the Humbug Placer Mine describes a site of hydraulic placer mining. Only the Victoria Mine is a silver mine. In consideration of the huge impact gold and silver mining has had on the social, political, and economic development of Arizona, the number of listed gold and silver mining properties clearly is an under-representation of an important historic theme.

Those properties listed on the National Register that are directly related to historic gold and silver mining in Arizona include the Victoria (earlier called the La Americana) silver mine in Pima County, the Lynx Creek District in Yavapai County, and the Humbug Placer Mine in Maricopa County.

The Victoria Mine, first known as the La Americana, was identified primarily because it happened to be located in the Organ Pipe National Monument, and was inventoried by the National Park Service in conjunction with its management of the monument. Primarily a silver mine, the Victoria has also produced gold, copper, and lead, and is the richest and oldest mine within the organ Pipe National Monument. Historically, this small mine was first operated by Mexican miners in the 1870s, acquired by an American in 1899 and worked until about 1910 when the combination of low silver prices and high levels of water accumulating within the mine slowed mining. From about 1910 through the 1930s, mine owner M. G. Levy made only minor improvements to the mine. Although he was described as a "leading miner, merchant, and well-regarded personality of the border and Ajo," the Victoria Mine did not make M. G. Levy into one of the giants of silver mining in the state (Hoy 1970:128-130).

The Lynx Creek District, located on lower Lynx Creek in Yavapai County, includes not only the site of gold placer mining along Lynx Creek, but also the Barlow-Massicks Queen Anne house, a prehistoric site (the Fitzmaurice Ruin), and prehistoric petroglyphs. Although Upper Lynx Creek was the setting for simple placer mining, the gravels of Lower Lynx Creek were not exploited until 1890. An Englishman, Thomas Barlow-Massicks, bought the property from Nathan O. Murphy (see biography of Frank Murphy in Appendix 3). Financed in part by English investors, Barlow-Massicks hired 90 men to assist him in constructing a dam, and several miles of ditch, flume, and pipe to carry

water. The final mile of 30-inch steel pipe is still visible near the house. However, a portion of the dam broke in February 1891; the reduced water storage behind the damaged dam reduced the amount of water carried by the ditch and flume, and so forced a reduction in the hydraulic mining operations. Barlow-Massicks built the Queen Anne-style house in 1890, and it still stands. After Barlow-Massicks' death in 1899, the property was sold to G. S. Fitzmaurice, who mined the creek through 1940, using a dredging operation.

Humbug Creek in north central Maricopa County was the site of an elaborate but unsuccessful attempt at hydraulic placer mining which was, in several ways, similar to the Barlow-Massicks operation on Lynx Creek. An Englishman financed by English investors, Daniel Keating formed the Yavapai Mining and Irrigation Company. In 1890-1891, at the same time Barlow-Massicks mined Lynx Creek, Keating's company constructed several small mining camps along the creek, two dams, a tunnel and ditch system, and a lime kiln. Today, the two dams and the tunnel remain intact, and the path of the ditch and flume system can still be traced down Humbug Creek. Taken as a whole the structures convey a sense of the size of the hydraulic operations. There are only a few archaeological remains of Keating's camps. In 1912-1915, the New State Hydraulic Company re-used the facilities. In both attempts,the paucity of water and the small quantities of gold recovered appear to have stymied the operators, and no great fortunes were made on Humbug Creek.

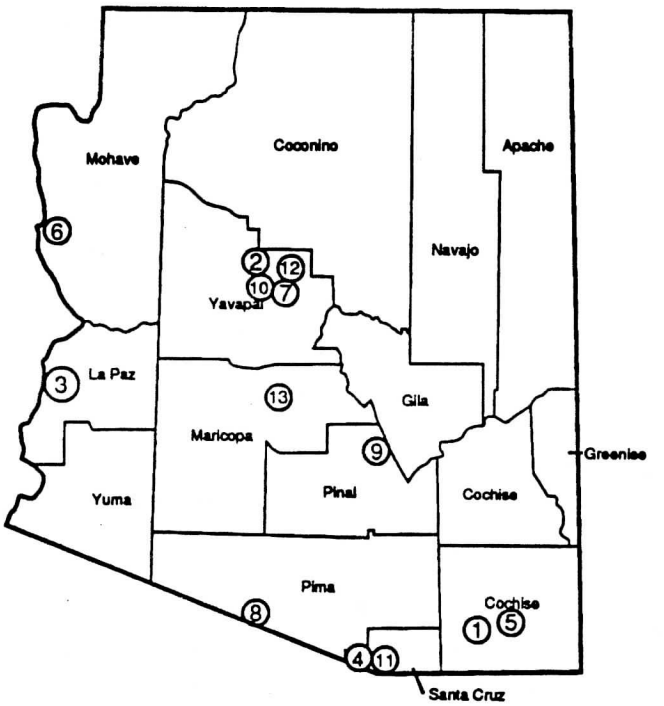
Those properties listed on the National Register that are only peripherally associated with historic gold and silver mining in Arizona include four towns or townsites (Tombstone, Prescott, Old La Paz, and Ruby), the Pearce General store, the Dublin Hotel in Oatman, the Poland haulage tunnel, the ruins of the Spanish mission at Guevavi, and two charcoal ovens. A brief description of the connection of each of these properties to historic gold and silver mining is outlined in the following paragraphs.

The Tombstone Historic District, which is also designated as a National Historic Landmark (one of three dozen within the state), includes only six square blocks of the central business district of Tombstone, and the public interpretation emphasizes the gunfight at the OK Corral. To be sure, the architectural landscape of a silver boom town is preserved, but the emphasis is on "the Old West." All mining claims in the area have been patented and remain in private hands (Hollis Cook, Tombstone Historic Courthouse Museum, personal communication, 1992).

Similarly, although the Prescott Territorial buildings included on the National Register did serve as a supply center to the gold and silver mining communities in the Bradshaw Mountains, they do not represent one of those communities. The town of Prescott, in addition to being a supply center, also served the military and ranching communities of the area, and also served as territorial capital and county seat.

Old La Paz, site of a gold placer boom in the 1860s, once boasted 5,000 residents. The deteriorating adobe buildings were destroyed by a flood about 1910, and the flood-swept archaeological remains of the town site are not likely to include placer workings (Barnes 1960:378; Sherman and Sherman 1969:90).

Although primarily lead and zinc producers, the mines of the Oro Blanco district in Santa Cruz County have produced enough silver over the past one hundred years to rank as a top Arizona silver mine (refer to Table 1-3, entry 18). A settlement known simply as the "Montana Camp" grew up



Map No.	Property Name	Town/ Vicinity	Criteria	Notes
1	Tombstone Historic District	Tombstone	A	silver mining camp; National Historic Landmark
2	Prescott Territorial Buildings MRA	Prescott	A,C	supply center for mines
3	Old La Paz	Ehrenberg	A,D	gold camp
4	Ruby	Ruby	A	silver and lead mining camp
5	Pearce General Store	Pearce	A,C	silver camp
6	Dublin Hotel	Oatman	C	gold camp
7	Poland Tunnel (AZ N:11:13 (ASM))	Poland	A,C	haulage tunnel linking Walker mines to Poland Mill and rail head
8	Victoria Mine (SN C:1:14 (ASM))	Lukeville	A	silver mine
9	Butte-Cochran Charcoal Oven	Florence	A	charcoal for silver smelter
10	Walken Charcoal Kiln	Prescott	A	charcoal for silver smelter
11	Guevavi Mission Ruins	Nogales	A,B,D	Spanish mission site for gold mining
12	Lynx Creek District	Prescott	B,C,D	gold mining, Barlow-Massicks house
13	Humbug Placer Mine	Phoenix	(in preparation)	hydraulic placer mining, dam, and ditch

Arizona Gold and and Silver Mining and Mining-Related Locations Listed on the National Register of Historic Places **Figure 2-2**

around the mine of the same name in the late 1870s; after the population of the town boomed beginning in 1909, the new postmaster named the town to honor his wife in 1912. In 1927, a St. Louis company bought up the ten Montana claims and operated them until 1941 (Sherman and Sherman 1969:130-131). In 1992, at the urging of the Arizona Preservation Foundation, the Arizona State Parks Board approved funding to help preserve the extant adobe and timber buildings in the mining town of Ruby.

Two of the listed properties are buildings constructed to serve boom towns. The Pearce General Store in the silver mining town of Pearce and the Dublin Hotel in the gold boom town of Oatman owe their existence to the historic gold and silver mining industries of Arizona, but do not convey specific information about the nearby mines.

The 8,017-ft long Poland Tunnel (sometimes called the Poland-Walker Tunnel) was built in 1904 to haul ore from the Walker mines to the mill and railhead in Poland; it remained in operation until 1930 (Coggin 1991:112). Although not specifically a gold or silver mine, the tunnel was important in the later development of silver and lead mines in the Bradshaws.

The Guevavi Mission Ruins were nominated for their significance as a Spanish mission. Although gold mining is documented during the occupation of the mission, there are apparently no recognized remnants of mining in the area.

Both the Butte-Cochran and Walker properties reflect activities associated with silver processing. The Butte-Cochran Charcoal Kilns were built in 1882 by the Pinal Consolidated Mining Company to produce charcoal used in smelting lead and silver ores mined in the Martinez Canyon and Mineral Hills districts southwest of Superior. Charcoal produced in these five kilns fueled the smelter, which produced two million pounds of lead and silver in the first half of 1883 (Debowski and others 1976:128-129: Rickard 1987:202).

The Walker Charcoal Kiln is a beehive-shaped structure in excellent repair, located just outside the historic mining town of Walker, in the Walker Mining District southeast of Prescott. Charcoal produced in this kiln fueled the smelter at Howells, less than a mile down Lynx Creek from Walker. Built in 1882, the Howells smelter produced nearly $174,000 of lead and silver that year, but closed shortly thereafter (Jim McKie, Prescott National Forest, personal communication, 1992; Rickard 1987:204).

As was true of the mining sites identified in the AZSITE database, the gold and silver mining associated properties listed on the National Register seem to have been identified more or less by happenstance. Most have been designated for reasons other than their significance as mines. There has been no inventory survey targeted on major gold and silver mines in Arizona. Instead, most mining sites have been found by chance discoveries during surveys undertaken for various other purposes.

In addition to the National Register listings, we checked the informal statewide inventory of historic properties at the State Historic Preservation Office. This list has also been computerized, and so we were able to search the files to identify all properties that included the word "mine." The resulting printout has been reproduced for this report as Appendix 5, and lists a total of 41 properties. Many

of these repeat AZSITE listings, and many are related to copper or lead mining rather than silver and gold mining. Only two of these identified sites have been listed on the National Register, the Milton Mine (primarily copper) and Victoria Mine (silver), both in Pima County.

No Arizona mines or mining properties have been described in the Historic American Buildings Survey (HABS) or in the Historic American Engineering Record (HAER) (Barker and Huston 1989:Appendix A).

A Glimpse at Some Relevant Reports

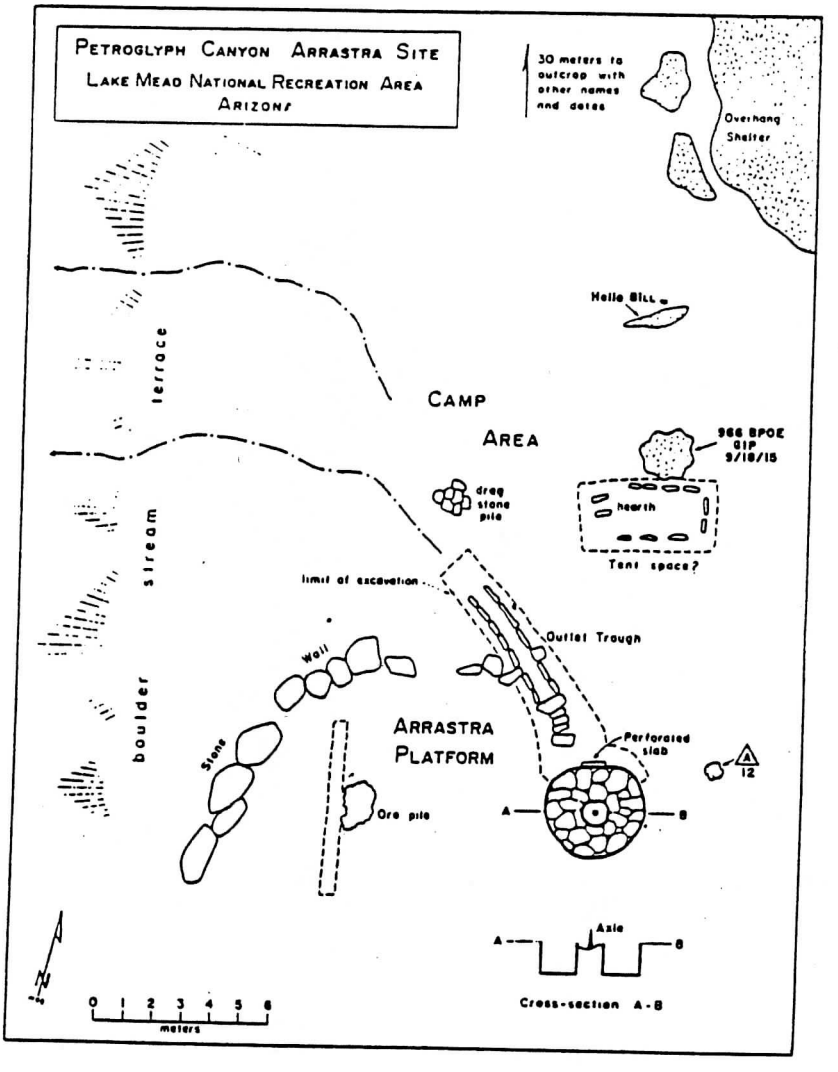
We made no attempt to comprehensively review technical reports in conjunction with preparation of this historical context, but we do highlight several reports of investigations simply as examples of the types of documentation that exists.

One of the few inventory reports that specifically targets mining properties was prepared by the National Park Service (1983) as part of an inventory of cultural resources within the Lake Mead National Recreation Area, which the Park Service manages. This study is very likely the source of the cluster of recorded sites that we identified from the AZSITE files in the "AZ F" quadrangle. The survey investigated the Katherine, Eldorado Pass, Black Canyon, Minnesota, Gold Basin, Gold Butte, Lost Basin, and Bentley mining districts. Several small sites, including an arrastra site (Figure 2-3) were identified, but few were deemed to have sufficient integrity or significance to warrant nomination to the National Register. Another compilation of historic site data along the Colorado River from Lee's Ferry to the border with Mexico identified 32 possible mill sites, but these were not revisited; information on their condition is not available (Westec 1980).

Surveys on the Barry M. Goldwater Air Force Range in the southwest corner of the state have noted some of the mining sites in the area. For example, the location of the Fortuna Mine has been briefly described (University of Arizona 1986:10-17), and one very ephemeral, turn of the century prospector's camp, perhaps occupied by Mike Donovan, has been recorded (Bruder and others 1988:53-54). The Fortuna Mine was determined to be eligible as a significant archaeological site, but has not been listed on the National Register due to unknown objections. Donovan's Camp has been recommended as not being historically significant.

A recent survey in South Mountain Park in south Phoenix recorded an ephemeral miner's camp similar to Donovan's Camp on the Goldwater Range (Bostwick and Howard 1992:56-60). Remnants of a room constructed of quartz rubble, probably excavated from a nearby prospect, and fewer than one hundred artifacts were all that remained at the site, which was probably occupied for no more than a few weeks sometime during the 1880s or 1890s. Historic records indicate that the Salt River Mining District, which was centered on South Mountain, produced 7,000 ounces of gold, 5,000 ounces of silver, and 28,000 pounds of copper from the late 1800s to 1982. The most productive mine was the Max Delta, which was worked most intensively during the Great Depression of the 1930s.

Another recent survey project has been undertaken in the vicinity of the Carlota Mine, a copper mine in the Pinal Mountains near Miami. The history of this mine is not well documented, but it was



Archaeological Site Map of an Arrastra Platform **Figure 2-3**

(Source: Hardesty 1988:10)

worked at least into the 1940s. The surveyors have had to face the difficulty of how to deal with more than 200 claim cairns, test holes, short adits, and shallow shafts that are difficult, if not impossible to date, and have few associated artifacts and features (Richard Ahlstrom, SWCA, Inc., personal communication, 1992).

We have been able to identify only five mining properties in Arizona that have been investigated by historical archaeologists beyond initial recording. These include the Jackrabbit (Reynolds and others 1974) and Reward mines (Teague 1980) on the Tohono O'odham Reservation, Old and New Rosemont in the Santa Rita Mountains (Ayres 1984), and the Humbug hydraulic mining complex on the southern flank of the Bradshaw Mountains (Ayres and others 1992).

Jackrabbit and Reward were both copper mines. Mining was intermittently pursued at these locations from about the 1870s to about 1920. Tohono O'odham laborers were part of the work force at both mines. Old Rosemont was a small mining town and smelter site occupied from about 1894 to 1905. New Rosemont was a mining town where about 200 Mexican laborers resided from about 1915 to 1921. Both Old and New Rosemont were associated with copper mines.

The Humbug hydraulic mining complex represents two attempts to mine gold placers. The first dates from 1890 and 1891. Dams and ditches for a hydraulic system were constructed with English capital. The operation failed to recover significant amounts of gold and shut down within three of four months of the start of hydraulic mining. The second attempt dates from about 1912 to 1915, and represents a small scale, unpressurized, wet sluicing operation that apparently was successful in recovering some gold. The archaeological record of the complex includes the main dam, a cut-off dam, a ditch, three tunnels, two roads, a kiln used to produce lime for mortar to build the dam, placering debris, and two main camp sites where building foundations and cobblestone floors, tent platforms and trash scatters were documented.

The final report we mention is Hardesty's (1988) review of historic mining properties in Nevada. This report provides a good overview of late nineteenth and early twentieth century mining technology used in the American West, and examples of the types of sites that are likely to be preserved.

EVALUATING THE SIGNIFICANCE OF HISTORIC GOLD AND SILVER MINING PROPERTIES

Historic preservation planning involves identifying historic properties, evaluating their significance, and assigning preservation priorities. Our review of inventoried and registered historic properties related to gold and silver mining in Arizona indicates that although substantial inventory work remains to be accomplished, the more challenging task will be evaluating their historical significance. Such evaluations are, of course, essential in targeting preservation efforts.

Participants in a recent historic mining conference observed again and again that assessing the significance of such sites presents significant challenges:

"Mining resources obviously pose certain inherent evaluation problems" (Noble 1990:28).

"The history of mining technology is complex, making the evaluation of significance difficult" (Spude 1990:31).

"Without question, assessing the integrity of historic mines is a difficult problem" (Hardesty 1990b:42).

". . . both the professionals and resource managers who deal with historic mining sites operate under a wide and often inconsistent, disorganized and conflicting spectrum of assumptions about the approaches, criteria of significance, and preservation options open to them in managing such sites" (Barker 1990:44).

Despite these warnings of preservationists who have been struggling with the evaluation of historic mining sites for a number of years, we have prepared the remainder of this chapter as guidance for separating historically significant from insignificant properties related to the mining of gold and silver in Arizona. In preparing this guidance, we envisioned the potential audience as including (1) cultural resource consultants who may encounter a mining site on inventory surveys driven by some modern development, (2) federal or state agency cultural resource specialists who might be interested in developing more proactive strategies for managing a number of mining properties on lands they administer, and (3) preservation activists or local government officials who might be wondering whether that old mine or mining ghost town they know about is important and warrants preservation efforts. All readers are warned at the outset that this discussion does not provide a "cookbook" or a simple key to follow to formulate recommendations regarding the historical significance of any particular mining related site, but instead offers a more general perspective for developing relevant documentation. The intent is to establish some consistency in significance determinations, primarily through examples of properties listed on the National Register and hypothetical cases.

This discussion is based on several key sources, which can be consulted for more detail:

- conference papers presented by several researchers who have been working on these issues for a number of years (Barker and Huston 1990)
- *National Register Bulletin 15*, "How to Apply the National Register Criteria for Evaluation"
- *National Register Bulletin 16*, "Guidelines for Completing National Register of Historic Places Forms"
- *National Register Bulletin 30*, "How to Identify, Evaluate, and Register Historic Rural Landscapes"
- *National Register Bulletin 32*, "Guidelines for Evaluating and Documenting Properties Associated with Significant Persons"

- two draft *Bulletins: National Register Bulletin 36*, dealing with historical archaeology, and *National Register Bulletin 42*, dealing specifically with identifying, evaluating, and registering historic mining properties

Because these last two *Bulletins* are in draft form at this writing, readers should be aware that changes incorporated into the final versions may have implications for some of the following discussion. The acceptance of this report as an element of the State Historic Preservation Plan implies some recognition by the State Historic Preservation Office of the usefulness of this guidance, but evaluations of specific properties must involve consideration of their individual merits, which may vary from the examples discussed here.

Within the regulatory arena of historic preservation, the criteria for inclusion in the National Register of Historic Places have been adopted as the fundamental standards for formally evaluating historical significance (36 CFR Part 60). We note that these standards have been adopted for the Arizona State Register as well, although the State Historic Preservation Office has flexibility in registering properties that may not be considered National Register eligible. There are four components to the National Register standards that address (1) the categories of historic properties that are potentially eligible, (2) the criteria for identifying significant historic values, (3) the fundamental need for the properties to retain integrity, and (4) considerations of particular classes of properties that are considered eligible only under exceptional considerations. In the following sections, each of these aspects are discussed as they relate to mining properties.

Potentially Eligible Property Categories

The primary requirement for National Register listing is that historic values be tied to tangible properties. The National Register is a listing of places and things. Much of what we value about the past are intangible historic lessons, morals, or "truths," but such intangible values are not eligible for listing on the National Register. The categories of potentially eligible properties have been classified as buildings, structures, objects, sites, and districts.

Buildings include a variety of edifices that may have been built for a variety of purposes, but they have in common the trait of providing human shelter in some form. If they have deteriorated into ruins, they are considered **sites** (see below). Buildings that might be related to the mining property types we identified above include administrative or office buildings, warehouses, workshops, mills, smelters, houses, bunkhouses, mess halls, or a variety of commercial buildings.

Structures are defined as constructed facilities built for purposes other than to provide human shelter. With respect to mining properties, these could include claim cairns, dams and ditches for hydraulic mining operations, adits and shafts, head frames, charcoal kilns, roads, railroad grades, and bridges.

Objects are defined as being primarily artistic, or smaller in scale than buildings and structures. Small, transportable objects not designed for a specific location, such as furniture, are typically not eligible. With respect to mining, some potentially significant objects include pieces of equipment such as engines, mill stamps, steam boilers, water jacket furnaces, ore cars, railroad engines, monuments, and statuary.

Sites are locations that may possess historic significance regardless of the condition of any buildings, structures, or objects that may be present. These could include prospecting localities with small shafts or adits, placer or lode mining localities with tailings and waste rock piles, archaeological remnants of mills and smelters, and archaeological remnants of miner camps, and boom towns.

Districts are clusters of the various property categories linked by plan or history of development. Districts can be defined to recognize features that may lack individual distinction, but as a whole embody significant historic values. Districts may include "noncontributing" elements, and still be National Register eligible. The degree of intrusion that can be tolerated before a district has lost its significance is to some degree a subjective consideration that must be based on professional evaluation. Districts are a particularly important property category for mining properties because it is often the combination of elements of a complete mining system (including various property types representing extraction, processing, and associated habitation and commercial activities) within a landscape that will best reflect significant historic values (Feierabend 1990).

Criteria for Evaluating Historic Values

National Register guidelines specify that a historic property must meet at least one of four criteria for identifying significant historic values. In shorthand, these can be thought of as typically reflecting associations with:

A. history (broad events or patterns)
B. biography (historically important persons)
C. architecture (distinctive characteristics of a type)
D. archaeology (information potential)

Criterion A

To be eligible under criterion A, a property must be "associated with events that have made a significant contribution to the broad patterns of our history" (36 CRF Part 60.4). Regardless of which of the four criteria a property may meet, completion of a National Register nomination form requires identification of an "area of significance," which is essentially a broad historic context reflecting significant patterns of our history. The National Register guidelines provide 30 categories that can be used to characterize areas of significance. Historic mining properties could be expected to most commonly apply to the theme of **industry**, which is defined as the "technology and process of managing materials, labor, and equipment to produce goods and services" (*National Register Bulletin 16*). However, as draft *National Register Bulletin 42* points out, numerous other areas of significance also may be reflected in mining sites, including:

agriculture: for example, mines may be related to Spanish or Mexican era haciendas

commerce: precious metals from some major mines may have influenced monetary systems or market economies

community planning and development: many mining towns may reflect attempts at community planning at company towns

conservation: pollution stemming from mining activities, or exhaustion of local resources such as timber may have been focal points of natural resource conservation controversies

economics: wealth generated by precious metal mining affected local economies, and monetary policies often affected mining activities

education: schools of mines often used mines as laboratories or field schools

engineering: some mining properties may be significant for their engineered characteristics

ethnic heritage: various ethnic groups, including American Indians and immigrants from various countries, were often constituents of mining labor forces

exploration/settlement: prospecting and the resulting gold and silver rushes were major factors in stimulating early Euro-American exploration and settlement

invention: the drive to extract precious metals stimulated development of numerous metallurgical processes

labor: working conditions, worker safety, wage systems, development of unions, and labor strikes may be significantly associated with some mining sites

law: mineral law was often an important element of legal codes

literature: life in mining camps was sometimes an important setting for literary works

military: the role of the military in facilitating prospecting and mine development was often crucial; the military sometimes intervened in labor strikes

politics/government: mining districts were important local governmental entities; great wealth generated by some mining ventures was sometimes directed at achieving political influence

science: some mining sites may be related to scientific advancements in geology and metallurgy

social history: the social structure and organization of mining communities are important elements of the social history of the American frontier

Determining an area of significance in consideration of these optional categories is more than simply filling in a blank on the National Register nomination form, and this listing of potential areas of significance can provide guidance for considering the potential significance of individual properties.

However, this level of consideration is too generic for building a good argument that a particular property is significant under criterion A. The intent of Chapter 1 of this document has been to build a more specific historical context for identifying the significance of gold and silver mining in Arizona from 1848-1945. Individual properties could be related to the more specific themes, periods, and places that were identified in Chapter 1:

- Reviving Hispanic gold and silver mining in southern Arizona, pre-1848-1861
- First gold mining boom in western Arizona, 1858-1870
- Silver mining from northwest to southeast Arizona, 1870-1893
- Second gold mining boom in Arizona, 1890-1917
- Secondary gold and silver mining in Arizona, 1900-1942

Chapter 1 discusses the significance of these events in the history of Arizona, and relating specific properties to these themes could provide a basis for nominating them under criterion A.

National Register nominations require identification of the level of significance, with the options being local, state, and national. Gold and silver mining properties related to the themes identified in this context are logical candidates for having state level significance because this context was prepared from a statewide perspective. However, particular gold and silver mining properties related to the identified themes might more appropriately be designated as having local or national significance depending on the associations of those specific properties.

Criterion B

To be significant under criterion B a property must be "associated with the lives of persons significant in our past" (36 CFR Part 60.4). Many historically important people were involved with mining in Arizona, and numerous individuals can be considered important because of their role in the history of mining in the state or within local areas of the state. Some of these persons are identified in the appended brief biographies, and any properties associated with these individuals, such as mines, mills, smelters, or homes, could be candidates for nomination under criterion B.

General guidance provided by the *National Register Bulletin 15* should be considered when preparing a nomination under criterion B, The associations must be with individuals, not groups. The property should ideally be associated with the person's productive life, and reflect the period of this significance. Comparisons with other historic properties that may be associated with the individual should be made.

Criterion C

To be eligible under criterion C a property must "embody the distinctive characteristics of a type, period, or method of construction, or . . . represent the work of a master, or . . . possess high artistic values, or . . . represent a significant and distinguishable entity whose components may lack individual distinction" (36 CFR Part 60.4). This criterion is commonly used to nominate buildings with distinctive architectural characteristics of defined styles. Certainly the homes or commercial

buildings in towns associated with mining might qualify under this criterion, but criterion C can also be used for significant engineered structures. Mining related properties such as the shafts and adits that comprise mines themselves, as well as buildings and structures associated with milling and smelting sites could be considered under criterion C.

Draft *National Register Bulletin 42* specifically notes that at many mining complexes the whole may be substantially greater than the sum of its parts, and criterion C specifically recognizes these types of properties as potentially significant. Even if individual components of historic mining properties lack individual distinction, the entity as a whole may be significant. For example, buildings at a mining complex may have collapsed, machines may have been salvaged from their mounts, and rail tracks may have been removed, but in combination with remains of paths, roads, shaft openings, trash heaps, ruins of head frames, and large tailings piles, such sites may yet collectively create a landscape that conveys an image of historically significant mining operations (Feierabend 1990).

Criterion D

To be significant under criterion D a property must "have yielded or may be likely to yield, information important in prehistory or history" (36 CFR Part 60.4). This criterion is typically used to determine the significance of archaeological sites. Because archaeological remains of mining activities are much more extensive throughout the American West than intact historic buildings and structures (see DeLony 1990:8), this is an important criterion for evaluating mining related properties. A description of the remains of the 1890s boom town of La Fortuna in the desert of Yuma County summarizes what commonly constitutes the archeological record of mining camps:

> From the hillsides above it is possible to identify numerous "squares" and "rectangles" from which the desert stones were pushed back to form the "floors" of tents and other shelters. Even walkways from tent to tent can be seen. The only identifiable remains at this part of the camp is the wooden floor structure, sawed lumber toilet seats, and metal urinal of a communal mens' toilet facility. Large amounts of turn-of-the-century refuse can be seen at both camp areas, such as old tent grommets, tin cans, razor blades, broken glass containers, and spent firearm shells (Baker 1980:7-8).

The key to transforming such descriptions into significance evaluations is a research design (see Edaburn 1982; Hardesty 1990a, 1990b). Such designs are based in research frameworks or strategies that identify problem domains and indicate why these research interests are significant. Archaeological research is dynamic, and assessments of important research issues are continually debated and modified. Once specific research questions are specified, sites can be assessed to determine whether they, in fact, are likely to contain data that can be used to address those questions.

It must be noted that archaeology sites can be significant for reasons other than their information potential, and are occasionally nominated under criteria A, B, and C as well as D. Draft *National Register Bulletin 36* specifies that historical archaeology sites may be eligible under criteria in addition to D to a far greater extent than previously considered. On the basis of this guidance Barker (1990:49) suggests that the particularly visible archaeological remnants of a mining camp might be eligible under criterion A even if the site lacks information potential, making it ineligible for listing

under criterion D.

Integrity Considerations

Integrity is the ability of a property to convey its historic significance, and is a necessary requisite for consideration of National Register listing. This requirement is a real challenge for many mining related sites because of their inherent "boom and bust" nature. Mining properties are commonly abandoned, with equipment almost always salvaged and removed for use elsewhere. When mines "busted" sometimes their owners demolished buildings and structures to reduce tax burdens. Often the buildings and structures were insubstantial and have been left neglected and exposed to harsh climates. Back country enthusiasts have often carried off other remnants as souvenirs. In addition, reoccupations typically destroy remnants of earlier occupations. For example, the original occupation of the Oro Belle Mine in the Bradshaws began with a single burro arrastra in the 1860s, was replaced by a steam powered arrastra type milling facility in the 1870s, which, in turn, was replaced with a stamp mill in the 1880s. The twentieth century concentrator that now lies collapsed in ruins on the site very likely eliminated most evidence of the earlier occupations (Spude 1975, 1990:32).

National Register guidelines recognize that considerations of integrity will vary somewhat with the criteria that are considered for historical significance. For example, the integrity that an archaeological site must possess in order to have potential to yield important information is very different than the integrity a house must retain to display significant architectural qualities. Archaeological sites are by definition in ruins and do not retain the original appearance of the buildings, structures, or objects that characterized the site during its occupation. However, the depositional context of the archaeological deposits must retain sufficient integrity to allow meaningful archaeological reconstruction of the history of the sites. Properties considered significant under criteria A, B, or C must retain essential physical features of the historic era they represent, and these features must be sufficiently visible to convey associations with important events and persons, or to illustrate distinctive characteristics of the period of significance.

The National Register guidelines recognize that all properties change over time, and specifically acknowledge that a property does not need to retain all of its historical physical features to be determined historically significant. The guidelines define seven aspects of integrity to consider in various combinations when evaluating a property's integrity.

Location is an important element of integrity. Typically historic properties should be in their original locations. Because some types of mining equipment, even such large facilities such as stamp mills, steam boilers, or water jacket furnaces, were intended to be relatively movable pieces of equipment, they might be found in locations other than where they were originally used. If the associations are historic, such factors should not be considered to be a lack of integrity that flaws an otherwise eligible property. Pieces of equipment moved onto a mining site later than the historic era of significance cannot be considered to be contributing elements, but they may not necessarily detract substantially from an otherwise intact site. "Artifact gardens" that are created by assembling pieces of equipment from a variety of locations for display do lack integrity and are not eligible.

Consideration of **design** involves evaluations of whether the original purpose, plan, and function of

a mining property remains sufficiently intact to be understood and appreciated. The layout of extraction or processing activities may be appreciated even if some of the components of the system are not fully intact. Mining sites routinely evolved as they were worked and such modifications during the historic era should not eliminate properties from being considered significant. Nor should inaccessible or unsafe underground segments of mines necessarily affect the integrity of the surface components.

The **setting** or physical environment of mining properties is an important component of integrity, but it must be recognized that mines were industrial facilities representing complex built environments. Newly constructed buildings or reworked landscapes resulting from recent renewal of mining activities certainly could impair the setting of historic mining properties to the point of destroying their integrity. Conversely, the setting of abandoned mining sites with intact tailings and waste piles in an otherwise unchanged remote environment can be powerful aspects of their integrity.

The **materials** of mining sites should be original unless remodelings reflect a series of significant historic occupations. If some aspects of properties have been replaced or restored, comparable materials should have been used. Recreations of buildings or structures fabricated to look historic are not National Register eligible.

Historic mining properties should ideally retain some evidence of original **workmanship**, which is evidence of technology, crafts, or aesthetic principles. Workmanship can be reflected in vernacular methods and traditions as well as in more innovative styles, and could be evidenced by timber shoring techniques, or construction of simple board and batten shacks, as well as high style homes of mine owners.

Feeling is a property's expression of the historic or aesthetic sense of a particular period of time. The abandoned industrial properties or ghost towns of mining related sites may not reflect the bustle and hubbub of active mines, mills, and smelters, but as draft *National Register Bulletin 42* points out, the feelings evoked by abandoned mining complexes can be legitimate reflections of the character of the boom and bust cycles that typify mining.

Association refers to the direct link between properties and significant events or persons. Associations must be demonstrated by historic research and also require that physical aspects of the property remain sufficiently intact so that contemporary observers can appreciate that relationship. Significant mining properties should retain sufficient features to convey a sense of the historic mining activities that were associated with those properties.

National Register Bulletin 15 recognizes that all aspects of integrity do not have to be met to make a property eligible, but at least several should be. Some of these integrity considerations are, to at least some degree, subjective perceptions, particularly aspects of feeling and association. These attributes by themselves are never sufficient to make a case for integrity. The strategy for evaluating integrity should involve linkages to the relevant significance criterion or criteria for which a property is being nominated. Integrity evaluations should determine whether the property has the physical characteristics to convey a sense of why, when, and where a property is important. Comparisons with similar properties may often be useful in such evaluations.

Draft *National Register Bulletin 36* also suggests that considerations of **visibility** and **focus** may be important ancillary considerations in evaluating the integrity of historical archaeology properties (also see Noble 1990). Some mining sites may be richly and abundantly visible, having numerous obvious historic features that enhance their integrity. However, if the visible remains have been highly altered, they may lack sufficient focus because their historic appearance has been lost and historical and archaeological methods could not interpret the sites. Other sites may lie in ruins or have been thoroughly salvaged or "cleaned up" to the point that many aspects of the sites are essentially invisible, but if features such as adits, shafts, waste piles, tailings, processing sites, house or tent sites, headframes, cemeteries, privies, and trash dumps remain intact, the site is likely to retain sufficient archaeological focus to be a legitimate form of integrity. Many mining sites have witnessed more than single occupations, and thus these properties may lack focus if their archaeological remnants are jumbled. If one episode of use can not be distinguished from another, the property may lack sufficient integrity to be deemed significant.

Exceptions

Several special class of properties are normally not considered eligible for the National Register including:

> "cemeteries, birthplaces, or graves of historical figures, properties owned by religious institutions or used for religious purposes, structures that have been moved from their original locations, reconstructed historic buildings, properties primarily commemorative in nature, and properties that have achieved significance with the past 50 years" (36 CFR Part 60.4)

If these seven exceptional classes of properties are integral parts of districts that otherwise meet National Register criteria, such properties can be considered contributing elements. They may be considered to be individually significant if they meet one of these criteria considerations:

a. a religious property deriving primary significance from architectural or artistic distinction or historical importance

b. a building or structure removed from its original location but which is significant primarily for architectural value, or which is the surviving structure most importantly associated with a historic person or event

c. a birthplace or grave of a historical figure of outstanding importance if there is no other appropriate site or building directly associated with his or her productive life

d. a cemetery which derives its primary significance from graves of persons of transcendent importance, from distinctive design features, or from association with historic events

e. a reconstructed building when accurately executed in a suitable environment and presented in a dignified manner as part of a restoration master plan, and when no other building or structure with the same association has survived

f. a property primarily commemorative in intent if design, age, tradition, or symbolic value has invested it with its own historical significance

g. a property achieving significance within the past 50 years if it is of exceptional importance

We anticipate that the most likely exceptional property classes that might be associated with historic mining properties are graves or cemeteries associated with mining camps and boom towns.

REVIEW OF THE SIGNIFICANCE OF NATIONAL REGISTER LISTED PROPERTIES AND HYPOTHETICAL EXAMPLES

In this section we review the criteria that have been used to nominate previously listed National Register properties related to gold and silver mining in Arizona, and present some hypothetical examples of the types of properties that might be eligible or ineligible under the four significance criteria. These are intended as general "rules of thumb" and the characteristics of specific properties may very well result in evaluations that vary from the examples discussed here.

Criterion A Examples

We note that almost all of the gold and silver mining properties that have already been listed or determined eligible for listing on the National Register have been determined to be significant under criterion A (Table 2-4). We suspect that many more are eligible under this criterion because, as demonstrated in Chapter 1, gold and silver mining does represent a series of important events and broad patterns for the history of Arizona.

Extraction Properties

None of the National Register listed properties are exploration sites. Exploration sites are likely to be quite simple, evidenced only by claim cairns and shallow prospecting holes. These might occur in substantial concentrations in some localities, suggesting possible consideration as a district nomination, but they are likely to be intact only in locations that were not subsequently developed. This indicates that valuable bodies of ore probably were not present. Accordingly, simple exploration properties that remain intact are unlikely to be eligible under criterion A except possibly as contributing elements of a larger district.

Development and production sites consist of mines themselves. These might include placer mined areas, as well as hard rock or lode mines, which might vary from relatively simple pits and trenches of "chloriders" to elaborate underground networks of shafts and adits. Undoubtedly, the major consideration in evaluating mines under criterion A would be issues of integrity. As discussed above, buildings and structures associated with mines, such as warehouses, offices, and headframes, are likely to be in various states of dilapidation or decay. Hoisting or ore moving equipment such as tracks and ore cars are likely to be missing. The National Register guidelines clearly indicate that

such properties must retain sufficient physical features to convey a sense of the historic activities that were pursued at the site. If shafts and adit openings are clearly visible, if roads and paths indicate the organization of the mine along with evidence of where structures such as headframes and buildings stood, and if piles of waste rock and other debris represent the location of mining activities, a site may contain sufficient integrity to reflect the important historic features of mining sites.

Considerations of relative significance should be made. *National Register Bulletin 15* specifically acknowledges that it is appropriate to accept a greater degree of alteration or fewer features for rare but important sites. Only a single Arizona mine has been listed on the National Register, the Victoria, which represents the silver mining boom of 1870-1893. Features at this site include a stone building, a stone lean-to shelter, a concrete cistern, a stone stairway, some head frame timbers, and a large shaft. Because none of the other themes are represented, lesser levels of integrity may be acceptable in order to represent important historic mining themes in the state. For example, no sites representing the theme of reviving Hispanic gold and silver mining in southern Arizona, pre-1848-1861, which was a major stimulus for American settlement, have been nominated to the register. If any of these mines remain intact, they are likely to be little more than simple adits or shafts. Nevertheless, if associations could be demonstrated, such rare sites are likely to warrant nomination.

At the other end of the spectrum, the 1900-1942 era of secondary gold and silver mining has less importance for the history of the state. That does not imply that a small, well preserved mine of a Great Depression miner does not warrant consideration because it did not produce much gold, but such sites may require more integrity to warrant consideration. The fact that no properties reflecting this theme have yet been listed on the National Register should also be considered. In sum, we anticipate there is substantial probability of identifying additional mines with sufficient integrity to represent the various periods of gold and silver mining within the state.

Processing Sites

Four historic gold and silver processing properties have been listed on the National Register under criterion A. These include the Butte-Cochran and Walker kilns that produced charcoal for smelting during the silver boom of 1870-1893, and the mill town of Ruby and the Poland Tunnel, both of which are related to the second gold mining boom of 1890-1917.

The potential of identifying other significant sites to represent the various historic subthemes that have been identified is again limited by the issue of integrity. In fact, mills and smelters have probably been more subject to salvage and dismantling than mine facilities themselves because of the value of the equipment they housed. Or as Spude (1990) points out, much heavy machinery was simply salvaged from mining sites for scrap metal during the two world wars. We anticipate that the potential for finding fully intact mills or smelters is very low, but as with the mines themselves, there may be at least some processing sites that are sufficiently intact to reflect the various subthemes of gold and silver mining. For example, the processing facilities at the Oro Belle Mine, owned by the Arizona Historical Society, at least warrant evaluation of their integrity.

Table 2-4

Summary of Significant Gold and Silver Mining and Mining-Related Properties in Arizona and Potential for Identifying Additional Significant Properties

	Property Types			
	Extraction			
Criteria	Exploration	Development and Production	Processing	Associated Habitation and Commercial
A: history (events and patterns)	(p)	PP	P	PP
renewal of Hispanic mines, pre-1848-1861				Guevavi Mission NHL
1st gold boom, 1858-1870				Old La Paz, Prescott Territorial Buildings MRA
silver boom, 1870-1893		Victoria Mine	Butte Charcoal Kilns Walker Charcoal Kiln	Tombstone NHL, Prescott Territorial Buildings MRA
2nd gold boom, 1890-1917			Town of Ruby Poland Tunnel	Town of Ruby, Pearce General Store
secondary gold & silver mining, 1900-1942				
B: biography (important persons)	(p)	(p)	P	P
renewal of Hispanic mines, pre-1848-1861				Guevavi Mission NHL
2nd gold boom, 1890-1917				Lynx Creek District
C: architecture (distinctive characteristics)	(p)	(p)	P	P
1st gold boom, 1858-1870				Prescott Territorial Buildings MRA
silver boom, 1870-1893				Prescott Territorial Buildings MRA
2nd gold boom, 1890-1917			Poland Tunnel	Pearce General Store, Dublin Hotel (Oatman), Lynx Creek District
D: archaeology (information potential)	(p)	(p)	P	PP
renewal of Hispanic mines, pre-1848-1861				Guevavi Mission NHL
1st gold boom, 1858-1870				Old La Paz
2nd gold boom, 1890-1917		Humbug Placer Mine*		Humbug Placer Mine*

(p) = low potential for identifying significant sites with further inventory
P = potential for identifying significant sites with further inventory
PP = substantial potential for identifying significant sites with further inventory

* concurrence determination; nomination under criteria "a" and "c" for the dam and ditch being drafted (see Ayres and others 1992)

Associated Habitation and Commercial Properties

The communities associated with mining have always received the most consideration by preservationists, and although only six residential or commercial properties have been listed on the National Register under criterion A as reflections of gold and silver mining in Arizona, this is more than in any other category. These reflect the subthemes of renewing Hispanic mines (Guevavi Mission), the first gold boom of 1858-1870 (Old La Paz, Prescott Territorial Buildings MRA), the silver boom of 1870-1893 (Tombstone National Historic Landmark, Prescott Territorial Buildings MRA), and the second gold boom of 1890-1917 (the ghost town of Ruby and the Pearce General Store).

The relative abundance of significant properties in this category undoubtedly reflects the extra effort that was expended in construction of habitation and commercial facilities in communities with the expectation that they were likely to be more permanent than facilities constructed at the mines themselves or at processing facilities. In many cases, habitation and commercial buildings were abandoned when the mines they served closed, but in other instances they continued to be occupied and hence were better maintained. Tombstone never died and thus some of its buildings dating from the silver boom of 1870-1893 have survived, and substantial sums have been invested in restoration. Commercialization of Tombstone has reached a level comparable to places such as Virginia City, Nevada and Central City, Colorado, and threatens its historic qualities.

The public interpretation of Tombstone emphasizes the gunfight at the OK Corral and the violence of life in the West more than the history of silver mining. Likewise, the connections of the Guevavi Mission and the Prescott Territorial Buildings to mining are peripheral. Other properties such as the ghost town of Ruby and the general store at Pearce are more directly linked to mining communities that thrived during the second gold mining boom in Arizona.

The ghost town of Ruby has survived so well because of its conscientious owners. Numerous other ghost towns, such as Charleston, Contention City, Fairbank, Crown King, Gleeson, Courtland, Dos Cabezas, Stanton, Octave, Weaver, Oro Blanco, Goldfield, and Goldroad, are much less well preserved but are suggestive of the potential for inventorying additional properties that warrant nomination in this category.

Old La Paz, representing Arizona's first gold boom in western Arizona, 1858-1870, is essentially an archaeological site. The listing of this site suggests that others, such as the La Fortuna camp, may have sufficiently "visible" archaeological remnants to be potentially National Register eligible.

Criterion B Examples

Two of Arizona's gold and silver mining properties listed on the National Register have been nominated under criterion B. The Guevavi Mission is associated with the influential Spanish missionary, Father Eusebio Kino; although the mission community is reported to have pursued some mining of gold, no physical evidence of these activities have been documented. The Lynx Creek District nomination cites the importance of Thomas Barlow-Massicks in constructing the dam that created Lynx Lake and operating a hydraulic gold placer mining system on Lynx Creek during the

second gold boom, 1890-1917.

The lack of other criterion B listings is not due to the lack of recognized individuals who played important roles in the development of gold and silver mining in Arizona. Certainly, much of the labor associated with mining and processing of ore was done by those "ordinary" people whose lives are seldom well recorded in historic documents, but many of the well known persons associated with gold and silver mining in Arizona are discussed in Chapter 1. Brief biographical sketches of several individuals are appended.

Although properties associated with any of these individuals would be candidates for National Register nomination, the probabilities of identifying sufficiently intact properties associated with many of them is low. However, some possibilities might be pursued. For example, if evaluation of the Vulture Mine indicated sufficient integrity for nomination, its association with Henry Wickenburg might warrant listing under criterion B. Jackson McCracken's association with the McCracken Mine, George Harrington's association with the Oro Belle Mine, and Frank Murphy's association with the Humboldt Smelter are other possibilities. Houses owned by prominent mine owners or managers may also have survived in some associated mining communities. Charles Poston's grave and monument on Poston Butte might also warrant consideration for nomination, but it would require developing an argument that it is sufficiently significant to warrant listing under exceptional considerations.

It must be remembered that associations with important persons ideally should reflect the productive period of their lives, and the physical remains should reflect these associations. For example, it may be impossible to document any direct association between Pauline Weaver and any remnants of the mining town of Weaver that was named after him. Conversely, historic research might yield substantial linkages between particular mine developers and historic properties but that is not an indication these associations necessarily warrant nominating under criteria B. For example, the investigation of the Humbug Creek placer mine documented the entrepreneurial career of Daniel E. Keating in considerable detail, which involved not only promoting one of the rare hydraulic mines in Arizona but also pursuit of other mining and agricultural ventures in central Arizona. However, the research indicated that none of the projects he promoted apparently ever succeeded, and thus nomination of the Humbug Creek complex under criterion B was inappropriate.

In sum, there is potential for identifying mines, processing sites, and properties in associated towns and camps that may have associations with individuals who played historically significant roles in the development of gold and silver mining in Arizona. The chances of nominating prospecting sites under criterion B is low because such associations would be difficult to demonstrate, and such properties are unlikely retain integrity because significant discoveries probably have been eradicated by subsequent development.

Criterion C Examples

Five historic properties related to gold and silver mining in Arizona have been listed on the National Register under criterion C. The Prescott Territorial Buildings relate to both the first gold boom and the silver boom of the nineteenth century; however, this multiple resource property includes the commercial and governmental buildings of the Courthouse district rather than mine or mining camp

buildings or structures. The Dublin Hotel in Oatman, the Barlow-Massicks House in the Lynx Creek District, and the Pearce General Store are commercial properties related to the 1890-1917 period of the second gold mining boom. Although much of the vernacular architecture associated with gold and silver mining camps and towns is likely to have not been well maintained, there is some potential that other residential and commercial buildings are sufficiently intact to warrant consideration for nomination because of their distinctive architectural characteristics.

The fifth property listed under criterion C is the Poland Tunnel, which is an example of how the distinctive characteristics of engineered structures can be historically significant. The absence of any mills and smelters on the inventory is glaring. The technology represented by these properties was a key to the success of gold and silver mining efforts, and the rapid development of this technology is one of the most noteworthy aspects of the history of mining in the American West. However, to be eligible under criterion C the distinctively engineered features of processing facilities must have retained their integrity, and need to be more intact than for consideration under criterion A. Many processing facilities were modified as technology changed, or were stripped of equipment when the ore was exhausted in the area, or the mining economy "busted," or have deteriorated into ruins since they were abandoned. The probabilities of identifying historic mills and smelters with integrity are probably not great, but may warrant some targeted inventory effort.

Many simpler facilities, such as arrastras, have probably deteriorated into archaeological remnants, although they probably would not have to retain all their working parts to convey the distinctive features of their technology. In consideration of their rarity, and because of the importance of this early technology, relatively well preserved arrastras may be candidates for nomination under criterion C. It would be essential to be able to document the associations of such features, and dating and relating such features to mining themes may be very difficult, if not impossible.

The engineered features of mines themselves are also candidates for evaluation under criterion C. The technology of tunneling, shoring, and providing air, light, and water, as well as facilities for transporting miners and ore involve distinctive characteristics of a type that would warrant nomination if they retain integrity and historic associations can be documented. Again, integrity issues are likely to be substantial. Many abandoned mines are so unsafe that there is no reasonable way to even inventory their underground components. Because placer mines are surface phenomena they are more amenable to inventory, but typically are represented by little more than waste piles. Hydraulic placer mines are an exception. The dams, ditch, and tunnels of the Humbug Creek placer mine are candidates for consideration under criterion C as well as under other criteria.

Criterion D Examples

Two Arizona gold and silver mining related properties have been listed on the National Register under criterion D. These include the Guevavi Mission which, as explained above, is only peripherally related to mining activities, and the site of Old La Paz, once reported to have 5,000 residents during the first boom period of gold mining in Arizona. The Humbug Creek placer mine complex has also been determined eligible, and data recovery studies were undertaken within the placer mined areas and associated camps, and at a kiln site used to make lime for mortar to construct the dam that diverted the water into a ditch. [The Lynx Creek District was also nominated under criterion D for

the prehistoric Fitzmaurice Ruin, not for any archaeology related to the hydraulic placer mining that took place within the district.]

Because so many gold and silver mining sites have decayed into ruins, the potential for listing other archeological sites would seem to be substantial. If they are to be considered eligible, a case has to be made that they can yield important information. Many mining related sites may simply not have this potential. For example, the remnants left at prospecting sites are probably so minimal that they are unlikely to be very informative. Historic records of mining claims are much more likely to yield important information about the timing and location of exploration activities than will the physical remains themselves. The recording of the physical evidence of exploration activities and assessment work may provide useful confirmation of historic records, but these sites are likely to yield little additional important information and therefore do not warrant consideration for National Register listing unless they are associated with other types of properties, such as campsites.

The potential for mining sites themselves to yield important information is likely to vary greatly, depending on the abundance and complexity of the physical remains at these sites. Simple mines with few remains are unlikely to yield information beyond what can be gathered during initial recording. The historical documentary record of such mines might be much more informative that the physical remains. Larger and more complex sites may yield substantial information with further study. For example, historical archaeological research might yield information on the chronology of mining at the site, the scope and scale of mining, the mining technology employed, and how activities at the mine might have changed through time. Such information may be available in historic records, and if so, the information values of the physical remnants of the site may not warrant listing under criterion D, whereas they may at mines that are poorly documented in the historical record. Spude (1990) observes that the technologies documented in contemporary text books and engineering manuals, appear to have been routinely modified to cope with particular characteristics of specific ores. Therefore, the physical record has potential to demonstrate the differences between theory and site-specific practices.

The physical remnants of processing sites, such as mills and smelters, also have potential to provide important information. For example, Spude (1990:33-34) points out that the silver lixiviation process was first perfected at the processing facility at Pinal, Arizona in 1885. Although the facility is an archaeological site, it has potential to yield important information about this development, if studied in combination with the historic documents relating to the site and drawings of similar plants, such as those that exist for the Lexington Mill in Butte, Montana. Although not a gold or silver mining site, Teague and Shenk's (1977) historical archeological investigations at the Harmony Borax Works demonstrates how archaeological study can yield information about ore processing technology. Examination of the patterning of placering debris within the Humbug Creek placer mine revealed differing hydraulic and wet sluicing techniques that were historically undocumented.

As *National Register Bulletin 15* cautions, not every archaeological ruin of a mill will be significant under criterion D. For example, a mill site that contains physical evidence and patterns reflecting processing functions but is partially destroyed, will not be considered eligible if comparisons indicate similar but more intact properties are known. Issues of integrity will again constitute the primary challenge in nominating gold and silver processing facilities under criterion D. Researchers are commonly faced with confusing arrays of concrete pads and machinery mounts at mining sites. If

the equipment has been so thoroughly salvaged that the physical remnants cannot be interpreted, then it will be impossible to build a case for significance under criterion D, but it is also the obligation of evaluators to be informed about the history of technology so that evaluations are based on knowledge.

Various types of archaeological sites associated with mining, but particularly residential areas such as towns and camps, have substantial potential to provide information about temporary mining communities. Although the archeological investigation of historical mining sites has accelerated substantially in recent years, this research must still be considered to be in an early stage of development. Only a handful of mining sites have been archaeological investigated in any detail within Arizona, and even in states such as Nevada, which is perhaps the most active area of archaeological research of mining sites in the West, the situation is not much different (Reno 1990).

Several recent papers address the issue of defining information potential at historic mining sites (for example, Barker 1990; Edaburn 1982; Hardesty 1986, 1988, 1990a, 1990b; Reno 1990), and others provide good perspective for formulating research designs within current historical and industrial archaeological research strategies (for example, Teague 1974 and 1988). Research goals may include filling in the gaps of local culture history; reconstructive historical ethnography and all it entails, such as demography, social organization and history, economics, technology, and ideology; development of archaeological techniques and methods based on better understanding of site formation and transformation processes; and searching for patterns among features and artifact assemblages that may be attributed to materialistic forces affecting the lives of the site occupants or their cognitive mind sets. The scale of research domains may vary from an individual locality, to an entire mining district, to state, national and international systems.

Draft *National Register Bulletin 36* recognizes the need for flexibility in demonstrating information potential at historical archaeology sites. Test excavations will not be considered mandatory, and varying levels of detail regarding site contents and structure are likely to be acceptable under different management settings. Building any argument of information potential is likely to require some combination of archaeological and historical information to identify the relevant temporal and thematic associations of the property, at least at a preliminary level. Problem domains will have to be identified, and a case will have to be made that the site contains artifacts and features in interpretable contexts that can be studied to address those research questions. Current topics of interest include issues related to community and household variability and change; community planning and layout; regional settlement hierarchies and social geography; political organization; trade networks and consumer behavior; material correlates of ethnicity, class, and gender; social history and demography; economic systems; and ideological systems and cultural world views, such as the importation of Victorian culture into the frontier camps of the West. Evaluators of information potential should consider whether relevant information to answer identified questions is best obtained from the written or archeological records or both.

Concluding Thoughts on Significance Evaluations

Historic properties related to gold and silver mining are abundant in many parts of the state. The fact that so few gold and silver mining properties have been listed on the National Register undoubtedly

reflects the lack of targeted inventory surveys, but also is probably due to the fact that many gold and silver mining sites lack sufficient integrity to be deemed significant. The boom and bust nature of mining means that many of these properties have been abandoned and neglected for decades. The materials at many of the sites have been salvaged for use elsewhere. New boom cycles have led to reoccupations that have destroyed remnants of earlier mining activities. By their very nature, mining sites are likely to be in some disarray.

Additional significant gold and silver mining sites are likely to be identified as a result of two very different approaches. If the recommendations of this report should stimulate inventories targeted on gold and silver mining sites, the historical perspective brought to such an endeavor should simplify the identification of historical significance to some degree. The second strategy will be those cultural resource management inventories driven by modern development projects. Surveyors involved in these are likely to continue to identify more and more mining sites and they face a daunting challenge in evaluating the significance of those discoveries. First, simply trying to identify what metal or metals were mined at such sites may be difficult and will usually require historical research. Chapter 1 of this report should provide relevant historical perspective, but additional historical research will be needed to provide details for specific sites. Whatever inventory strategy is used, the biggest challenges in evaluating mining sites are likely to revolve around questions of integrity.

Integrity is one of the more subjective aspects of significance evaluations, and acceptable levels of integrity will vary depending on which significance criteria are being considered. The essential task is to demonstrate that the significant "why, where, and when" is reflected in physical features of the properties. With respect to mining sites, this challenge is likely to be easiest if properties or districts can be defined to encompass several types of mining activities and preferably aspects of entire mining systems. For example, it will be impossible to evaluate a hydraulic mining ditch if the parameters of the entire system are not understood. It will probably even be impossible to recognize what the ditch is. Likewise, a smelter site that is not very well preserved may take on additional significance if it can be related to the mines that it served, the transportation systems that connected them, and the residential areas where workers lived. This does not imply that small sites are necessarily insignificant. In fact, a series of small sites with information potential may, upon further study, begin to reveal historical patterns never before appreciated. It is quite possible that as more gold and silver mining properties are identified and evaluated, the information gained may lead to revisions of the thematic history presented in Chapter 1, based on the documentary record. Historic preservation will have achieved an important goal if it stimulates the development of new archaeological and historical perspectives.

SUMMARY

A great variety of historic property types may reflect gold and silver mining in Arizona, but they are likely to be classifiable into three broad categories: (1) extraction sites, including exploration, development, and production sites, (2) processing sites, including mill and smelter sites, and (3) associated habitation and commercial sites, especially camps and boom towns. Despite the important role of gold and silver mining in the history of Arizona, no thematic mining property inventories have been pursued within the state. Current inventories are not organized to facilitate compilation of sites where gold and mining features have been identified, but we were able to summarize information on

115 mining sites in the computerized AZSITE files maintained by the Arizona State Museum, and approximately 40 in computerized files maintained by the State Historic Preservation Office. Many of these sites were common to both databases. Only meager amounts of information are available about these sites, and many are probably related to the mining of minerals other than gold and silver. Only 13 properties with any relation to gold and silver mining in Arizona currently are listed on the National Register of Historic Places. Two of these, the Tombstone Historic District and the Guevavi Mission, have been designated as a National Historic Landmarks, but the relation of these properties to gold and silver mining is peripheral. Many of the other listed properties represent residential and commercial activities associated with mining rather than the mining activities themselves.

Evaluating the significance of historic mining sites may be difficult, but these properties could be considered National Register eligible in a variety of contexts. Remnants of gold and silver mining activities are relatively abundant on the landscape, but the greatest challenge is identifying properties that retain sufficient integrity to be deemed historically significant. Given the importance of gold and silver mining to the history of Arizona, further inventory and evaluation efforts are warranted. Preservation planning issues and recommended strategies for managing historic gold and silver mining sites within the state are discussed in the next chapter.

CHAPTER 3
PRESERVATION ISSUES AND RECOMMENDED STRATEGIES

Although gold and silver are not among the famous "Five Cs" resources of Arizona (climate, citrus, cotton, cattle, and copper), prospecting for and mining of these precious metals was, as summarized in Chapter 1, a major theme in the Euro-American exploration and settlement of Arizona. Many names on our landscape are related to gold and silver mining activities, and many communities, some surviving and thriving and others abandoned, were established as gold or silver mining camps, or mill and smelter towns.

The remains of gold and silver mining sites are scattered across much of the state's broad mineral belt, and these historic properties are an important component of the state's heritage. But as documented in Chapter 2, only a handful of what must be thousands of historic properties related to gold and silver mining have been formally inventoried within the state, and the significance of the vast majority of these has never been evaluated. A single silver mine, the Victoria/La Americana, has been listed on the National Register of Historic Places; none of Arizona's major gold and silver mines have been listed.

We can only guess at some of the reasons behind the paucity of National Register listings for gold and silver mining properties. The technology of mining is unfamiliar to the non-miner, and mining sites are not as easily understood as town sites. Also, mining companies often salvaged machinery at the close of a mining phase, leaving only mysterious wooden structures or skeletal foundations. Profitable mines often remain in private hands, and have been worked and re-worked over time, obliterating traces of historic mining activities.

Despite these difficulties, or perhaps because of them, preservationists should increase their efforts to save at least a sampling of Arizona's historic gold and silver mines. The purpose of this chapter is to highlight several issues related to the preservation of important historic gold and silver mining properties, and to suggest strategies for encouraging and coordinating future survey, inventory, evaluation, and conservation of significant properties.

ISSUE 1: Few historic mining sites have been inventoried, fewer have been evaluated, and only a handful are listed on the National or State Register of Historic Places.

STRATEGY: The SHPO could support thematic inventory studies focusing on all types of historic properties related to gold and silver mining. There are many strategies that could be pursued. Individual national forest ranger districts, or Bureau of Land Management resource areas, could be encouraged to undertake comprehensive inventories of mining sites (for example, gold and silver mining sites in the Bradshaw Mountains or the Santa Rita Mountains, or in the *Kingman* Resource Area). Or Certified Local Governments could be encouraged to undertake inventories (for example, the gold and silver mining sites of Yuma County). A third option would be to support a statewide inventory of ten important gold and silver mining operations with the goal of generating National Register nominations. Candidates for the "ten most important sites" might include early silver mines such as the Mowry and Salero mines in the Patagonia Mountains; early gold operations at the Vulture

Mine and Rich Hill; the Crown King, Tip Top, and Peck mines in the Bradshaw Mountains; lode gold mines in western Arizona such as the North Star, KOFA, and Harquahala mines; the silver and lead mines of the Cerbat and Chloride districts; the richest gold country in Arizona in the Oatman district; and silver mines and mill sites in the Tombstone district; and the smelter site at Humboldt. A fourth option would be to support studies to record particular types of sites (such as inventories of arrastra sites, milling locations, smelters, or abandoned mining camps). SHPO could undertake some of the survey responsibilities under the Rural Preservation Initiative of the Arizona Heritage Fund.

ISSUE 2: Much of the previous evaluation of gold and silver mining sites has been pursued on an *ad hoc* basis, often dealing with individual properties in isolation. Many mining sites have been identified by serendipity as a result of surveys driven by proposed developments. Such surveys have arbitrarily defined boundaries that seldom allow consideration of complete mining systems, and often only individual components such as prospecting or mining locales, or just milling sites, or smelter locations, or associated camps and town sites, are dealt with in isolation.

STRATEGY: The SHPO could encourage evaluations of isolated mining system components to be made with the awareness that other uninventoried components may exist, and for those projects that lead to mitigative studies, the SHPO can encourage that effort be devoted to identifying all components. Even listed properties, such as the Tombstone National Historic Landmark, emphasize only the architecture of a silver mining town. To establish a more holistic perspective on mining in Arizona, perhaps a study could be initiated to investigate which associated mining and processing localities still exist and which warrant preservation efforts. This might be attacked with a mining district by mining district strategy.

ISSUE 3: Historic gold and silver mining properties are vulnerable because renewed mining activities stimulated by the cycles of boom and bust tend to reoccur in the same place. Thus, the remains of many early episodes of mining have been destroyed by subsequent mining and each new cycle of renewed mining activity threatens surviving historic properties.

STRATEGY: Any regulatory review of state or federally permitted mining activities should be aware of the potential for historic properties at existing mines. The SHPO may also want to consider a more proactive program of contacting owners of operating mines or mining associations to encourage them to consider options for identifying and evaluating historic properties, or, as a public service, generally supporting preservation programs related to mining.

ISSUE 4: Historic gold and silver mining properties are vulnerable because many are located on patented private lands, and as a result many are not being actively managed for preservation.

STRATEGY: First, the SHPO could encourage federal and state land managing agencies to more actively identify and manage gold and silver mining sites on lands they administer. The SHPO could work with private land owners to target specifically vulnerable properties located on private lands as candidates to be monitored by the Site Stewards program (such as the Butte charcoal kilns).

ISSUE 5: Historic gold and silver mining properties are vulnerable because of the general public fascination with precious metals and ghost towns. Often the appeal of weathered wood and old artifacts lead back country recreationists to collect such items and diminish the integrity of these sites.

STRATEGY: The SHPO can work to channel such enthusiasm about ghost towns into the Site Stewards program. The SHPO might also consider a carefully designed self-guided auto tour brochure that capitalizes on the interest in ghost towns to promote an ethic of appreciation and preservation of historic sites. Such a brochure could counter distorted histories, such as the ever popular legend of the Lost Dutchman's gold, with a more accurate telling of the evolution of prospecting, mining, and processing technology.

ISSUE 6: Public perception of mining is dominated by some of the myths of the Old West, such as anti-social prospectors, bold gunfighters, and raiding Apaches. The accurate portrayal of the social history of mining camps and towns warrants broader public interpretation.

STRATEGY: The SHPO could support or encourage preparation of accurate social histories of some of the mining camps and towns of Arizona. The studies should include an examination of the formation of historic mining districts and their political and legal powers.

ISSUE 7: Gold and silver mining are only one aspect of the polymetallic nature of the mining industry of Arizona, and mines originally developed to extract one type of metal ore, usually end up yielding other ores as well.

STRATEGY: The SHPO could support development of additional mining contexts. One focusing on copper mining, or perhaps all base metals (lead and zinc), should be a high priority. It would seem to be counter-productive to isolate preservation efforts by type of metal mined, but instead to coordinate preservation of all mining-related historic properties. At the same time, we must be aware of the tendency to over-emphasize the importance of copper mining at the risk of under-emphasizing gold, silver, and lead mining in Arizona.

ISSUE 8: Although the technology of processing gold and silver ores is well understood by mining engineers, the extent of processing at any one mill location in Arizona is not well understood. In mining jargon, a "mill" might include only rock crushing equipment or the full panoply of crushing, grinding, cyanide leaching, and smelting machinery. Thus, when a historical document refers to a "mill" at a certain location, the historian or historical archaeologist is unsure of the processing machinery that may have been in use there. Also, the correlation of milling processes with standing structures is also unclear. In historic photographs, "mills" are usually large, barn-like buildings that give few clues as to the machinery in use inside, and the effects that the evolving processing technologies had on the structures that housed them may not be visible in these photographs.

STRATEGY: The SHPO could support a historical study designed to reconstruct this aspect of the history of gold and silver mining in the state, with a particular emphasis on identifying milling and smelting sites, and identifying how physical remnants of such sites could be used to identify the

technologies pursued at sites that now exist only as abandoned ruins.

ISSUE 9: Mining had tremendous environmental impacts in certain locales, such as deforestation and pollution of water and air resources. The extent of such effects in Arizona are not well documented or understood.

STRATEGY: The SHPO could support or encourage a historical study to explore impacts of gold and silver mining on the physical environment of the state.

CONCLUSION

Historic preservation goals focus on saving tangible remnants of the past. The underlying assumption motivating preservation efforts is that this physical evidence will reveal lost information about the past, make important themes or events of the past seem more real and relevant, celebrate the accomplishments of our predecessors, and ultimately, enhance appreciation of the moral lessons embodied in the successes and failures of the past, thus providing perspective and guidance for our present and future lives. We believe that the excesses of the boom and bust cycles of gold and silver mining do provide lessons for wisely planning the exploitation of the state's mineral wealth and other natural resources. This context will have achieved its purpose if it initiates actions that result in greater public appreciation of not only the history of mining in Arizona, but also appreciation of the implications of that history for the future.

APPENDIX 1
GLOSSARY OF TERMS USED
IN THE HISTORIC GOLD AND SILVER MINING INDUSTRY

The following glossary has been compiled primarily from the glossaries in Young (1970), Bain (1990), and *National Register Bulletin 42 (Draft), Evaluating and Nominating Historic Mining Sites.*

adit a horizontal entrance into a mine

aggregate a rock from which ore may be separated by using only mechanical, not chemical, processes; see *free-milling gold*

assay a quantitative chemical analysis to determine components and value of metallic ores

alluvial deposit, alluvium
the sand and gravel transported by flowing water

amalgam a compound of mercury and gold, or mercury and silver

amalgamation
a process utilizing mercury to extract gold or silver from pulverized ore. The mercury combines with the gold and silver to form an amalgam; the amalgam is then heated to vaporize the mercury and leave the gold or silver as a residue. The mercury can be condensed from the vapor and re-used. Fumes produced by heating the amalgam are toxic.

annual assessment work
the $100 per year of labor or improvements to a mining claim required by federal mining laws

arrastra *(Spanish)* a primitive grinding mill for crushing ore; powered by mule, oxen, or water power

back the part of an underground lode located nearest the surface of the ground

batea *(Spanish)* a bowl used for washing gold from placer deposits, similar in function and size to a gold pan

bed a seam or horizontal vein of ore

bench a terrace along a stream bank left by an earlier, higher water flow

bit the steeled end of a borer or drill

blast in underground mining, to force off portions of rock by means of gunpowder. A hole is made with a borer, gunpowder is inserted and tamped in, and a fuse is attached and lit (see *tamping*).

Bolas de Plata
(Spanish, also Planchas de Plata) a celebrated find of native silver at Arizonac, Sonora, in 1736. Pieces of silver *(plata)* lay on the surface of the ground in chunks *(bolas)* and slabs *(planchas)*.

bonanza a rich vein, mine, or discovery of ore

bonnet a protective covering over the cage, shielding it from objects falling down the mine shaft (see *cage*)

borer a drill with a piece of steel at the end called a boring bit

bottoms the deepest workings in a mine shaft

bullion ingots containing both gold and silver; often sent to the U.S. Mint for final refining (see *dore*)

cage a frame with one or more platforms used to hoist men and materials up and down a vertical mine shaft

charcoal oven/kiln
a furnace in which wood is reduced to charcoal. The charcoal was used in smelting gold and silver ore

chlorides Silver ore lying above the water table where exposure to the atmosphere converts silver sulpherets to chlorides (see *sulpherets*).

claim a tract of land with defined surface boundaries which includes mineral rights to all lodes and veins of ore extending downward from the surface. In the United States, the maximum size for a lode claim is 600 by 1,500 ft; maximum size for a placer claim is 600 by 1,320 ft.

claim jumping
staking a claim over a previously established claim

claim marker a post or rock cairn, often whitewashed, placed at each corner of a claim

classifiers screen-like dividers to sort ore by size of rock after crushing. The grizzly, Trommel, and Dorr classifier are three different types of classifiers.

chloriders a derogatory term for silver miners who mined surface deposits or "scavenged the washes below the lodes" (Young 1970:25)

chlorination a chemical technology for milling complex ores, after the Frieberg chlorination process developed in 1858.

cob *(Cornish)* to break ore with hammers to separate the ore from the waste, or country rock

concentrate ore that has been crushed and had waste rock partially removed

concentrator a simple machine to remove ore-bearing rock from waste rock using a shaking, vibrating motion. Jigs, buddles, vanners, Embrey tables, and Wilfley tables are different kinds of concentrators. The term may also refer to the building that houses concentrating machines.

core *(Cornish)* mining shift. Miners usually worked six hours at a time, the "forenoon core" from 6 a.m. to noon, the "afternoon core" from noon to 6 p.m., the "first core by night" from 6 p.m. to midnight, and the "last core by night" from midnight to 6 a.m.

country rock waste rock or gangue

cradle a wooden sluice operated by rocking from side-to-side; used in placer mining.

crusher machinery to grind ore. Various types of crushers include ball mills, stamp mills, jaw crushers, rod mills, and tube mills.

cyanide process, or cyanidation
a technique developed in the 1890s in England to extract gold from low grade ores. The cruder method of mercury amalgamation may recover 60 percent of the precious metals from ore, while the cyanide process may recover as much as 95 percent. Because cyanidation extracted gold from tailings as well as from low grade ore, the introduction of the new process caused the gold boom of 1890-1917 in Arizona, as miners hurried to re-work waste from earlier mines.

ditch an artificial water course, flume, or canal to convey water for mining. A flume is elevated and made of wood, while a ditch is dug into the earth.

dore a product of cyanidation containing both gold and silver (see *bullion*)

double jacking
in underground mining, a method of drilling the holes to place dynamite. Two miners work together, one holding the drilling bit (or *steel*) in place with two hands while the second miner swings an 8-lb sledge hammer, or *double jack* (see *single jacking*).

dredge a large raft or barge on which are mounted either a chain of buckets or suction pumps to suck up alluvial deposits of sands and gravels from below the water's surface, elevate them, and wash them to recover placer gold

drift a horizontal passage underground which follows the vein of ore. A *crosscut* intersects the vein; a *level* may either follow or intersect the vein.

dry concentrating
a placer mining technique which uses a "dry washer" to extract the gold from placer deposits. The dry washer uses screens and bellows, rather than flowing water, to separate the heavier gold from the lighter waste rock.

fool's gold popular term for any mineral that looks like gold; most often refers to iron pyrite

free milling gold
gold that is easily separated from its country rock and needs very little milling or grinding

giant a water nozzle used in hydraulic mining; its name was derived from its manufacturing trade name. See *monitor*.

grinder machinery to crush ore between iron cylinders

grubstake supplies provided to a prospector in return for a share in his claims

headframe the steel or timber structure erected at the top of the shaft. The headframe carries the sheave or pulley for the hoisting rope, and may also be called a gallus frame, a gallows frame, headgear, hoist frame, or head stocks.

high grade ore of high value

high-grading stealing gold during mining. "From the miners' viewpoint, pocketing a bit of extremely rich ore was merely a traditional perquisite of the job. From the owners' point of view, it was outright theft. All gold miners denied doing it; most of them were collectively accused of it; the superintendent hoped at best merely to keep it to the irreducible minimum" (Young 1970:220-227).

hydraulic mining
a placer mining technique using water pressure to break down, wash, and transport gold-bearing placer deposits into a sluice where the gold can be trapped and collected. Delivering the high pressure stream of water requires a complex system including a diversion or storage dam, a ditch, a headbox connected to a pressurized pipeline or penstock, a hydraulic nozzle (often called a *monitor* or *giant*), and a sluice.

kibble *(Cornish)* a bucket, usually iron, in which the ore and tailings are hauled to the surface of an underground mine

lavadero *(Spanish)* placer deposit

levels in underground mining, horizontal galleries excavated at regular intervals below the surface. It is customary to work mines by numbered levels.

lode a continuous metal-bearing vein or deposit of ore (see *vein*)

lode gold gold found in lode deposits

long tom a long sluice or trough used to wash gold from placer deposits. A long tom is longer than a rocker or a cradle.

malacate *(Spanish)* a horse-powered whim (see *whim*)

milling the process of extracting metal from ore; may include crushing, grinding, chemical leaching, and smelting

mining district geopolitical entity established by a mining community for self-government

monitor a water nozzle used in hydraulic mining; its name was derived from its manufacturing trade name. See *giant*.

native gold gold in its metallic form found on the surface of the ground

native silver silver in its metallic form found on the surface of the ground

ore mineral of sufficient value and quantity to be mined at a profit

oro *(Spanish)* gold

outcrop the exposure at the ground's surface of a vein of ore

panning a simple placer mining technique which removes gold from placer deposits with only a shovel and a hand pan. As water, sand, and gravel are swirled in the hand pan, the lighter sand and gravel is washed over the rim and the heavier gold sinks to the bottom of the pan. Panning for gold is an old technique and may have been used in Arizona since the Spanish period.

patio process the first industrial chemical process to refine silver, invented in Mexico in 1554 by an amateur miner, Bartolome de Medina of Spain. The process, similar to the assay process of combining the silver with mercury, was used for three hundred years, particularly in areas of low skilled laborers, and limited water and fuel supplies. After crushing the ore to sand, the sand was spread in a thin layer across a stone platform (or *patio*), and then mixed with large amounts of common salt and copper sulphate to produce cupric and cuprous chloride. After some days, mercury was added to the mix, and the resulting mixture was again spread in a thin layer across the patio and

exposed to heat and sunlight, producing silver chloride. After 15-45 days, the silver, dissolving in the brine and reduced by the mercury, precipitated out as silver amalgam. The mixture was recollected, agitated in water to wash out the waste, and the silver amalgam was collected for retorting (see Young 1970:72-79 for a more detailed discussion of the process).

paydirt gold

placer alluvial deposit of sand or gravel eroded from original bedrock

placer gold gold found in placer deposits

placer mining
the removal of gold from placer deposits by mechanically concentration. Simple hand techniques include panning, sluicing, rocking, and dry concentrating; these hand techniques are labor intensive and only recover the larger pieces of gold. More complex, mechanized techniques such as dredging and hydraulic mining require more capital investment and allow lower grade deposits to be worked profitably.

plata *(Spanish)* silver

portal the surface entrance to a mine

prospect any mine workings of unproven value; an excavation showing a deposit of ore

prospect hole any shaft, pit, drift, or drill hole made to prospect mineral-bearing ground

real de minas *(Spanish)* mining district

retorting heating an amalgam of mercury and gold or silver to vaporize the mercury and leave the gold and silver as a residue (see *amalgamation*)

rocking a placer mining technique using a small sluice rocked back and forth to separate heavier gold from lighter sands and gravels

run of a lode the direction of the vein

salting falsifying the value of a claim in order to sell it for a higher price (see a lively discussion of the art of salting in Young 1970:40-52).

shaft a usually vertical excavation made to prospect or mine underground ore, or to hoist and lower miners and materials into a mine

sheave, sheave-wheel, shiv, shiv-wheel
(Cornish) the groove wheel of a pulley

single jacking
in mining, a method of drilling the holes to place the dynamite. One miner, working alone, held the drilling bit (*steel*) in place with one hand, swinging a 4-lb. sledge hammer, or *single jack*, with his other hand (see *double jacking*)

slag molten waste from the smelting process (see *waste, tailings*)

sluice, sluice box
a long, inclined trough that uses hydraulic power to concentrate gold in placer mining, typically built of heavy timber and water tight. Obstructions, or riffles, along the floor of the trough slow the flow of water and create pockets to catch the heavy particles of gold. Placer deposits are fed into sluices by hand, by hydraulic mining, or by dredges (see *cradle, long tom*).

smelting using the high heat of a blast furnace to melt ore and extract precious metals

smelter a furnace in which metal is separated, both chemically and physically, from its country rock

spalling *(Cornish)* breaking ore-bearing rock into small pieces prior to cobbing (see *cob*)

stamps, stamp mills
machinery operated by animal, water, or steam power to crush ore by descending pestles (*stamps*). The stamps may weigh as much as 2,000 lbs. each, and drop 6-8 inches 100 times per minute.

stope in underground mining, a large pocket of ore. "To stope out" is to excavate the pocket in a series of steps above and below a level.

sulpherets silver ore lying beneath the water table. Silver sulpherets are more difficult to smelt than silver chlorides (see *chlorides*).

tailings waste or leavings of an ore reduction process other than smelting; the term usually refers to the debris generated by stamp mills. Although the milling process has removed much of the precious metal from the tailings, they may be re-worked at a later date to retrieve more of the precious metals (see *waste, slag, cyanidation process*).

tamping the material, usually soft stone, used to position gunpowder for blasting in underground mining. Also refers to the process of inserting the material in the hole made by the borer, sometimes called the *shot hole*.

vein any zone or belt of mineralized rock lying within boundaries clearly separate from neighboring rock (see *lode*)

vena, veta *(Spanish)* a vein or lode of ore

waste rock broken in the process of opening the mine and excavating tunnels. In contrast to tailings, waste rock contains no ore and is taken to a waste rock dump (see *tailings, slag*).

whim a large vertical drum turned by horse power, steam power, or water power to raise ores from underground mines to the surface. The whim rope or whim chain attaches the kibble (bucket) to the whim.

widowmakers
the first pneumatic drills used in underground mining. While drilling holes to place dynamite, the first pneumatically-driven drills produced clouds of silicon dust. The dust in turn caused miners to suffer from silicosis of the lungs and early death. Improvements to the pneumatic drill used water to reduce dust.

workings all underground mining development

APPENDIX 2
CONTRIBUTIONS OF CULTURAL OR ETHNIC GROUPS TO HISTORIC GOLD AND SILVER MINING IN ARIZONA

> Ethnicity and ethnic relations are among the most important questions to be asked about mining settlements on the western frontier (Hardesty and Firby 1980:1).

In relating the stories of gold and silver discoveries, mining histories most often concentrate on wealthy mine owners and overlook the stories of mine laborers. Many of the ethnic groups involved in Arizona gold and silver mining have operated as anonymous mine laborers rather than flamboyant mine owners, and their histories have yet to be written.

HISPANICS

Hopes of discovering precious metals lured the first Spaniards to what is now Arizona, but these explorers failed to locate the riches in the region. Later, during the approximately 250 years of Spanish, and subsequently Mexican, hegemony, some successful mining was pursued in the Pimería Alta. When Americans entered the region after acquiring the land in the mid 1800s, they discovered scattered evidence of old Spanish and Mexican mining activities but little active mining. As the Americans conquered the region, mining was renewed; many Hispanics participated in the renewed industry, bringing with them their experience in Spanish mining techniques. Much of nineteenth century placer and simple lode mining technology in Arizona was borrowed directly from the Spanish, and many mining terms reflect that derivation (Officer 1987:15-16).

Several historians have suggested that the treatment of Hispanic miners by Anglo miner operators was more unequal than other Anglo-Hispanic situations. Anglo miners attempted both to exploit Hispanic labor and prevent Hispanic ownership of mines, although some Mexicans in Southern Arizona did own mines. For an example, Estevan Ochoa, who made his money in freighting, invested in mines (Martinez 1987:95; Officer 1987:404, note 91).

Specific References to Hispanic Miners

In the late 1850s, about 800 Mexicans recruited from northern Sonora worked for Samuel Heintzelman just west of Tubac. Mexican and Yaqui miners were the chief source of labor for the mines of the Sonora Exploring and Mining Company. Wages were low and living expenses were high; the Mexican laborers became indebted to the company store. An uprising in the mines near Tubac in 1859 killed four Mexicans and one Yaqui Indian (Greeley 1987:16).

Hired on by the Peeples party prospecting central Arizona in 1863, an unnamed Mexican set out to retrieve a pack animal that had strayed during the night. Scrambling up the slopes of a mesa, he made the first discovery of gold on Rich Hill. The hilltop deposit proved to be the richest placer

deposit *in* Arizona (Sherman and Sherman 1969:168).

At the KOFA Mine in Yuma County in 1898, Mexicans worked as "powder monkeys." As assistants to the miners in the stopes, they brought in dynamite, cut fuses, and carried in new steel for the drills. Also, they "mucked out" or shoveled the blasted rock (Keiser 1984:98, 101).

CORNISH

After the gold placers played out and lode gold and silver mines were opened in Arizona, miners were recruited from Cornwall for their legendary knowledge of underground mining. In 1888, the editor of *The Arizona Silver Belt* urged Cornish miners to leave Leadville, Colorado "where people die by hundreds of diseases peculiar to the climate and [are] buried at night to avoid alarm." In recruiting miners from Colorado to Arizona, editor Hackney failed to mention the heat and isolation of Arizona mines (Eppinga 1991:55-56).

Much of the terminology of underground mining has been derived from Cornish terms. *Whims, cobs, spalls*, and *kibbles* are Cornish terms that augmented the Spanish vocabulary of mining (see Appendix 1).

Specific References to Cornish Miners

Cornish miners migrated to work the silver mines of Globe in 1875 and stayed to work the copper mines there as well as in Bisbee and Morenci. Three Cornish families came to work at the Silver King mine near Globe in 1875. The Richard Trevathan, George Lobb (married to Trevathan's daughter), and John Knight families were from Penzance, Cornwall (Eppinga 1991:55).

Cornishmen worked in the gold mines of southwestern Arizona, and at the Vulture Mine where Cornishman Cyrus Gribble was superintendent in 1888. Often termed "Cousin Jacks" because it seemed that every Cornishman had a Cousin Jack willing and to work in the mines, they dominated the KOFA mine in Yuma County in the 1890s and were described as "clannish."

> I moved into the bunkhouse, a long adobe building now disintegrated. It had a corrugated iron roof and the partition only went up as far as the adobe walls, so of course one could hear all that was going on in the room adjoining. The company furnished cots and pads. In the room I was to occupy I found an Irishman, the blacksmith, McGraw; a Cornishman named Billy Horan; and three other Cornishmen. These latter had just come from Cornwall and were a fine bunch of boys; all clean, never left the bunkhouse at night, did not drink, swear or tell smutty stories. In the evening they would gather in front of the bunkhouse with others and sing for the benefit of men and their wives living about the boardinghouse. Perhaps eight women. Sometimes they insisted that I sing with them, which I did several times. They sang as well as the Welsh in my hometown in Pennsylvania. I began to feel like a "Cousin Jack." All the Cousins were not as clean and sober as the boys I roomed with (Keiser 1984:92).

The boom town of Pearce, near Tombstone, was named for a "Cousin Jack" who discovered gold ore on his ranch in the Sulphur Springs Valley in 1894 (Eppinga 1991:55).

NATIVE AMERICANS

Along with the Mexican miners of the Pimería Alta, Native Americans were the first laborers hired in the mines of the Arizona Territory. Their undocumented labors have largely been ignored by historians; a recent article on ethnic diversity in Arizona's early mining camps makes no mention of the Indian contribution to the silver mines of southern Arizona (Eppinga 1991:49-73).

Specific References to Native American Miners

Because Spanish mine owners had utilized Indian labor in Mexican mines since the Conquest, it is reasonable to assume that the Spanish mine owners in the Pimería Alta also utilized local Indian labor, including Tohono O'odham and Pima Indians (Young 1970:83-86).

A Yaqui Indian picked up the chunks of silver near Arizonac in 1736, a fabulous discovery that gave Arizona its name. Ironically, the location of the "Bolas de Plata" silver strike is today in Sonora, Mexico, not Arizona (Officer 1987:332-32; Walker and Bufkin 1986:48).

After 1814, Yaquis were the principal source of labor in the Guevavi mines located on the 1807 land grant to the Pimas and Papagos (Officer 1987:88).

In 1840, Yaquis were working in the mines near Altar (Officer 1987:154).

CHINESE

Chinese miners coming to Arizona met a great deal of racism and prejudice. Perhaps conditioned by anti-Chinese sentiments in California in the 1850s and 1860s, Arizona newspaper editors lashed out at the trickle of Chinese placer miners in 1869; the *Arizona Weekly Miner* stated that "there are now four of them in this vicinity, which is quite enough" (Eppinga 1991:58).

Chinese miners are documented as working in many of the remote mining camps throughout Arizona. By 1870, several Chinese were working placers on Lynx Creek near Prescott. Later, they also worked the placers on Big Bug Creek on the northeast slopes of the Bradshaw Mountains (Keane and others 1992:25).

In other parts of the American West, particularly Idaho and California, Chinese often worked placers with hydraulic mining techniques, but this does not seem to be true in Arizona. Due to the scarcity of water, there were few hydraulic operations in Arizona and none seem to have been operated by Chinese. Curiously, local tradition referred to a hydraulic mining dam along Humbug Creek as a "Chinese dam" when the operation was apparently operated by Englishmen (Ayres and others 1992).

When prejudice forced the Chinese miners out of the gold placers, they created other jobs for themselves as laundrymen, cooks, and merchants. They often raised and sold vegetables. Others worked as charcoal burners and wood carriers (Keane and others 1992:25).

Specific References to Chinese Miners

Chinese miners successfully worked placer claims on Big Bug and Lynx creeks south of Prescott, in the 1860s. However, as early as 1863, the laws of the Walker Mining District forbade "Asiatics" from working in the district (Keane and others 1992:24-25).

Fong (1980:7) relates the story of 10 Chinese miners who were swindled into purchasing right to a placer mine west of Tubac in the 1870s; the placers had been salted with gold to appear more profitable than it was. Their efforts to produce gold from the placers was unsuccessful; they were later killed by Apaches.

Reportedly, Chinese worked as charcoal burners at Butte City along the Gila River. The Butte-Cochran Charcoal Kilns were built in 1882 by the Pinal Consolidated Mining Company to produce charcoal used in smelting lead and silver ores mined in the Martinez Canyon and Mineral Hills districts southwest of Superior (Debowski and others 1976:128-129; Rickard 1987:202; Keane and others 1992:25).

Two Chinese restaurants operated in the gold mining town of Crown King in 1897, along with a post office, a company store, several saloons, and a feed yard (Wilson 1990:58).

At least two Chinese worked in the cook house and one as a watchman at the KOFA mine in 1898 (Keiser 1984:96, 104; Sherman and Sherman 1969:88).

The gold mining town of Congress had both Chinese and Mexican restaurants in the 1890s (Sherman and Sherman 1969:36).

Chinese ran laundries in the Bradshaw mining town of Tip Top in the 1880s (Sherman and Sherman 1969:151); in Seymour, location of the mill for the Vulture Mine (Sherman and Sherman 1969:136); and in the southeastern Arizona mining towns of Tombstone, Fairbank (Keane and others 1992:31), and Contention City (Sherman and Sherman 1969:41).

During the Tombstone silver mining boom in the early 1880s, Chinese ran laundries, sold vegetables they had grown, and served as housekeepers. Most lived in the Chinese section of town known as "Hoptown." Quong Kee owned the Can Restaurant at Allen and Fourth Street, and remained a respected member of the community until his death in the 1930s (Keane and others 1992:30-31).

Jack Lum, a first generation Chinese American, operated a boarding house at the Gold Road Mine in Oatman during the Depression. "The miners always preferred Chinese cooks because they were hard working people. They didn't drink, and they always wanted a job. All the mining cooks were Chinese [in the 1920s and 1930s]" (Lewis 1981:175).

AFRICAN AMERICANS

Contributions by African Americans to the gold and silver mining industries of Arizona ranged from the scholarly contributions of Henry Flipper to the mystery gold mine of prospector "Nigger Ben."

Specific References to African American Miners

West Point graduate Henry Ossian Flipper came to Arizona as U.S. Deputy Mineral Surveyor in Nogales in the 1880s. In addition to working as an engineer for the Greene Gold-Silver Company at Ocampo, Chihuahua, Mexico from 1905 until about 1919, Flipper utilized his knowledge of Spanish to translate Spanish and Mexican mining law into English (see Appendix 3 for a full biography of Flipper).

Gold prospector "Nigger Ben," whose real name may have been Benjamin McClendon, haunted the gold fields of Wickenburg from 1859-1861, the same time as Peeples, Bradshaw and Weaver. He was said to have located a gold mine outside of Wickenburg, the location of which he never disclosed. He was killed by Apaches about four miles west of Wickenburg (Eppinga 1991:56-57).

A hunter in southern Arizona with a similar sobriquet, "Nigger Brown," discovered gold on one of his hunting expeditions. A canyon in the Whetstone Mountains southeast of Tucson yielded three to four pounds of rich gold ore which the hunter brought into a Tucson store for assay. A subsequent expedition to relocate the ore was stymied by the appearance of Indian footprints along the trail. Brown himself was thought to have been murdered by Indians three years later; although his cabin was found, his body was never recovered (Eppinga 1991:57).

The 1880 census of Tombstone listed 12 African Americans working as cooks or bar help in the silver mining boom town (Spude 1979:8).

APPENDIX 3
BIOGRAPHIES OF INDIVIDUALS WHO MADE OUTSTANDING CONTRIBUTIONS TO HISTORIC GOLD AND SILVER MINING IN ARIZONA

Bean, Curtis Coe 1828-1904

Prospector, stamp mill owner, politician. One of Edmund Peck's partners in the discovery of the Peck Mine in 1875, Bean accompanied Peck and Territorial Governor Safford, an active investor in Arizona mines, on a tour of the Peck Mine in May 1876. Bean and Peck also were the first two to ride a coach over the newly improved road from Prescott to the Peck Mine in September 1877.

By 1878, Bean had purchased two stamp mills in the Bradshaw Mountains. Although the second ten-stamp mill was hampered by snow and legal difficulties through the winter of 1878-1879, he wrote to the *Arizona Weekly Miner* in March 1879,

> I have at a cost of seven thousand dollars rebuilt the mill [at Arrastra Creek near Walnut Grove]. I walked into a crazy, rickety mill, with the engine on rotten logs for a foundation, and the fly-wheel buried in mud. A battery that would not stand alone, and pulleys afflicted with delirium tremens, and I walked out leaving it one of the finest ten-stamp mills on the Pacific coast, and I did it legally. (Wilson 1990:27).

Three of the four partners in the Peck Mine, Peck, Bean and William Cole, embroiled themselves in continual legal wrangles over ownership of the mine in the late 1870s, and operation of the Peck Mine was often slowed or halted because of the suits and counter-suits. C. C. Bean went on to become a politician, being elected to the Territorial Legislature in 1878, and Congress in 1884. He traveled to San Francisco, Chicago, New York, and Boston promoting investments in Arizona's mines (Goff 1983:11,12; Wilson 1992:32-39, 46, 52).

Bradshaw, William D. 1826-1864

Prospector. Son of a Welshman who had fought in this country's Revolutionary War, William Bradshaw was born in North Carolina. The family moved to Missouri in 1845, and William and his brother Isaac headed to California for the Gold Rush in 1848. William served with Fremont's California Battalion. After 14 years in California, the two brothers came to La Paz in 1862. While Isaac operated their joint venture, a ferry across the Colorado, William joined the Walker party to prospect in central Arizona. Although he brought little gold back to La Paz, he left his name on the mountains south of Prescott. He committed suicide while drunk in La Paz in December 1864 (Wilson 1990:13-14).

Brady, Peter Rain[e]sford 1825-1902

Prospector, promoter, politician, interpreter. Although Peter Brady's primary mining interests

were in the copper of Ajo, he was allied with the silver miners so influential in the early days of Arizona. Born in Washington D. C., Brady headed west to join up with the Texas Rangers and fought with them in the Mexican War. After the Mexican War, Brady accompanied a party surveying a railroad route from Texas to San Diego, and acted as a Spanish interpreter for the Boundary Commission. Coming back to Arizona from California in 1856, Brady represented the American Mining and Trading Company, a San Francisco syndicate, and re-located copper deposits in Ajo. That same year, Brady joined Heintzelman, Mowry, Poston, and Ehrenberg in signing a petition requesting the establishment of an Arizona Territory separate from New Mexico. Fluent in several languages, Brady often acted as an interpreter for the Indians; he was elected Pima County sheriff, and served three terms in the Arizona Territorial Legislature. He settled in Florence, Arizona, marrying first a girl from Altar Sonora. After her death, he married a woman from Florence. He died in Tucson in 1902, age 77 (Brady 1975:171-194; Goff 1983:13-14; Hoy 1970:94; Young 1970:143).

Ehrenberg, Hermann Christian 1816-1866

Cartographer, mining engineer, mine owner. Born in Prussia, Hermann Ehrenberg was educated in civil engineering and languages in Europe before emigrating to North America. He fought in the Texas revolution, one of the few to survive the massacre at Goliad. After traveling to Oregon, Hawaii, and Polynesia, he joined John C. Fremont in California. Ehrenberg came to Arizona in the early 1850s as an employee of the Sonora Exploring and Mining Company in the silver mines at Tubac. He drew the first private map of the Gadsden Purchase lands and the silver regions around Tubac. In 1856, he was one of the five signers of the petition to Congress requesting separate territorial status for Arizona. By 1858, he resigned from the Sonora Exploring and Mining Company and purchased silver mines in the Cababi area west of Tucson. Living in La Paz in the early 1860s, Ehrenberg built roads out of La Paz toward Prescott, organized and drafted laws for the Castle Dome mining district, and established the La Paz Town Association. Rumored to be carrying a substantial amount of money on a business trip to California, Ehrenberg was murdered in 1866. His friend, Michael Goldwater, established the town of Ehrenberg in his memory (Goff 1983:31; Greeley 1987:16-17).

Farish, Thomas Edwin 1837-1919

Gold miner, historian. Although Farish is known primarily for his later work as a historian, it was the gold and silver of Arizona that brought him to the Territory. Born in Tennessee, Thomas Farish joined his father working in the California Gold Rush in the early 1850s. Later, he lived in San Francisco and was elected to the California Legislature in 1867-1868. The prospecting bug took hold again, and Farish came to Tombstone in the silver boom of the late 1870s. At one time, he also managed the Vulture gold mine. He served in several posts in Territorial government, and was appointed Territorial Treasurer in 1897. In 1913, he was appointed the state's first historian, a job he held until his death six years later. During his tenure as state historian, Farish produced the eight-volume *History of Arizona* that continues to be a primary source for early Arizona history (Goff 1983:33).

Flipper, Henry Ossian 1856-1940

Soldier, linguist, engineer. Flipper was born in the slave quarters of a Methodist parsonage in Georgia. After the Civil War, his family moved to Atlanta and Henry attended schools newly established by the American Association for the New Freedmen. As a student at Atlanta University, Henry received an appointment to West Point; he graduated in the class of 1877. He served in Texas and fought Comanches in Oklahoma.

In the 1880s, Flipper came to Nogales and served as U.S. Deputy Mineral Surveyor. Fluent in Spanish, Flipper translated Mexican mining statutes concerning colonization, mining, prospecting, and promoting mines, published in 1895 as *Spanish and Mexican Land Laws.* Later, he worked as a mining engineer for mines in Mexico, translated for the Senate Foreign Relations Committee, became an assistant to the Secretary of the Interior, and consulted for a New York-based oil company drilling in Venezuela. He died at his brother's home in Atlanta in 1940.

Harrington, George P. 1850?-1922

Mine owner. George Harrington, a banker from Illinois, first invested in Arizona gold mines in 1887 when he put money into developing the Crowned King Mine in the Bradshaw Mountains. He remained an investor and "hands-off" owner until his Illinois bank closed in the panic summer of 1893. At the 1894 Crowned King stockholder's meeting, Harrington was named manager of the mine and over the next three decades, he and his partner Noah Shekels would make the Crowned King gold mine prosper. In 1897, he brought the first electric dynamo into the Bradshaws to light the mine and the town, and to run power drills and the telephone system to Prescott. Harrington and Shekels also reopened the Tiger Mine, the Wildflower Mine, and the Oro Belle Mine; their company, Yavapai Consolidated, owned "all the promising veins within a four-mile radius of Crown King." Working with Frank Murphy, Harrington shipped ores to the newly refurbished Humboldt smelter, but the collapse of Murphy's mining-railroad empire in 1910 crippled Harrington's mining efforts in the Bradshaws. George Harrington died in Crown King in 1922. For an engaging description of Harrington's work in central Arizona, see Robert Spude's (1991) chronicle in the *Journal of Arizona History.*

Heintzelman, Samuel Peter 1805-1880

Military officer, mine owner, promoter. A military man all his life, Samuel Heintzelman was born in Pennsylvania and attended West Point. His military experiences including serving in the Seminole War in Florida, the Gold Rush in California, and at Fort Yuma. In 1854, Major Heintzelman, Poston, and Ehrenberg and 30 men explored northern Sonora and the Gadsden Purchase, looking for precious metals. Their discoveries convinced Cincinnati, Ohio investors to put money into a mining venture in southern Arizona. While remaining in the army, Heintzelman served as president of the Sonora Exploring and Mining Company from 1856-1859, and supervised the company's mine operations in the Arivaca and Cerro Colorado areas from August 1858 to January 1859. He was frustrated by the unskilled labor, crude equipment, and the high costs of transporting supplies and ore in and out of the remote mines.

Along with Poston, Mowry, Ehrenberg, and Brady, Heintzelman was one of the five men who signed the 1856 petition asking for separate territorial status for Arizona. At the outbreak of the Civil War, Heintzelman was recalled to the East, and was wounded at Bull Run. After his injury, he returned to Washington, D. C. and, along with his military duties, pressed for formation of the Arizona Territory. He died in Washington, D. C. in 1880 (Goff 1983:49-50

Marion, John Huguenot 1836-1891

Miner, newspaperman. Born in New Orleans, Marion came to California in the early 1850s, but learned the newspaper trade instead of the prospector's trade. In 1863, he left San Francisco and sailed to Yuma, Arizona. The next year, he came to Prescott and spent the next three years prospecting in central Arizona. In September 1867, he became editor and eventually part-owner of the influential *Arizona Miner*, the first newspaper published north of the Gila River in Arizona Territory. With his vitriolic prose and terrible temper, he soon was the best known editor in the territory. A Democrat, he was "inclined to be irrational on the subjects of Apache Indians and Republicans." He left the paper in 1875, served in the Territorial Legislature in 1877, spent twelve years as Yavapai County Treasurer, and fiercely opposed moving the Territorial capital from Prescott to Phoenix (Goff 1983:67-68).

McCracken (McCrackin), Jackson (dates unknown)

Prospector. A prospector who came to Arizona with the successful Walker party, Jackson McCracken was one of the few prospectors who not only located great wealth but managed to hold on to it. One of twelve miners and mining engineers elected to the 27-member first Territorial Legislature in Prescott, McCracken was refused a seat by his fellow legislators because of his lack of hygiene. When he refused to bathe, the rest of the legislature dragged him into Groom Creek for a bath. McCracken discovered the Del Pasco silver mine in the Bradshaw Mountains in 1870, and the McCracken Mine in Mohave County in 1874. He eventually retired to a ranch in the Santa Cruz Mountains of California and entertained men such as Ambrose Bierce and Bret Harte (Greeley 1987:21; Wilson 1990:17).

Mowry, Sylvester 1833-1871

Military officer, prospector, mine owner, promoter. Described as a "talented, sensual, arrogant, haughty, rash, strutting, and excessively ambitious personality," Sylvester Mowry cut a large swath across southern Arizona in the mid-nineteenth century. Born in Rhode Island in 1833, Mowry graduated from West Point in the class of 1852. Mowry came to Arizona as commanding officer of Fort Yuma in 1855, but resigned his military post three years later to prospect in southern Arizona. He purchased the Patagonia Mine in the Santa Rita Mountains south of Tucson about 1860, and operated it successfully until 1862 (Goff 1983:70-71).

Along with Poston, Heintzelman, Brady, and Ehrenberg, Mowry supported the 1856 petition requesting the U. S. Congress to establish Arizona as a separate territory. Edward Cross, editor of the *Weekly Arizonian* in Tubac and an opponent of separate territorial status, took

issue with the population figures Mowry used to argue for an Arizona Territory. The two men exchanged public letters in the paper, and flamboyant Mowry challenged Cross to a duel in 1859. Four shots were exchanged at forty paces, neither man was injured, and the two opponents retired to the company store for shots of whiskey. [Cross later returned to the East and was killed at the battle of Gettysburg.] (Wagoner 1989:390).

In 1862, Union troops arrived in Tucson from California and arrested Mowry. Accused of favoring the Confederacy, Mowry was jailed. Although he protested his innocence and was soon acquitted, General Carleton, commander of the California troops that occupied Tucson, confiscated Mowry's property by court order and sold it at public auction. In retaliation, Mowry wrote letters, published newspaper articles and filed suit against Carleton. Eventually, he received some monetary compensation from the federal government, and supporting resolutions passed by the U.S. Senate and the first Arizona Territorial Legislature. Although one historian labelled Mowry an "individualist and lecher," the *Arizona Miner* commented on his death by writing, "This is sad news for Arizona. In the death of Mr. Mowry this Territory has lost as faithful a friend as it ever had in the person of one man" (Wagoner 1989:460; Young 1970:143).

Murphy, Frank 1854-1917

Mine operator and owner, railroad builder. Born on a Maine farm, Murphy and his brothers grew up in Wisconsin. As a young man, he worked as a stage driver in California in 1887; Murphy first came to Arizona in March 1878 and worked at a haberdashery in Prescott. In 1883, he and Douglas Gray, a mining engineer, hauled an exhibit of Yavapai County ores to Denver, Chicago, and then to the New Orleans World's Fair in 1884. Murphy met Diamond Joe Reynolds and Senator W. A. Clark from Montana at the fair and convinced them to invest in Yavapai County mines.

Murphy's persuasions enticed Senator Clark to purchase a copper mine in Jerome; Clark later established the mill town below Jerome that bears his name, Clarkdale. Murphy convinced Diamond Jim Reynolds to purchase the Congress Mine in 1887 and allow Murphy to manage it. After Reynolds' death in 1891, Murphy and three others bought the mine and soon the Congress was Arizona's largest gold mine. After succeeding at Congress, Murphy and his associates bought the Poland silver and lead mine in the early 1890s and operated it until 1913. Murphy also owned interests in the Wildflower, Crown King, and Tiger mines of the Bradshaws.

In addition to managing and owning mines, mills, and a smelter, Frank Murphy worked to build railroads connecting his mining operations to markets. To service the Congress Mine, Murphy envisioned a railroad line connecting Ashfork to Prescott and Phoenix; the Santa Fe, Prescott and Phoenix Railway was completed in 1895. The Prescott and Eastern Rail Road [*sic*] (connecting Prescott to Mayer and completed in 1898), and the Bradshaw Mountain Railway (connecting Mayer to Crown King and completed in 1904) were built primarily as mining railroads to move ore from the mines to mills in the Bradshaws and the smelter at Humboldt, also owned by Murphy and his associates.

In other business dealings, Murphy owned the *Arizona Republican* Phoenix newspaper from 1898-1909, the Castle Hot Springs resort north of Phoenix, and was a founder and president of Prescott National Bank. Murphy and E. B. Gage, joint owners of the Congress Mine from 1891-1910, eventually moved south to re-open the Tombstone mines after the disastrous floods of the 1880s. Frank's brother, Nathan Oakes Murphy, served as governor of the Territory of Arizona in 1892-1893 and 1898-1902 (Coggin 1991:111-117; Goff 1983:71-72; Spude 1992:153-182).

Peeples, Abraham Harlow 1822-1892

Prospector, saloon keeper. The young North Carolinian headed west to Texas in 1846 and fought in the Mexican War. Then, like many other young men, Peeples headed to California in 1849, joining up with John C. Fremont. He came to Yuma in 1863; hearing Indian accounts of gold, Peeples hired Pauline Weaver to guide a prospecting party up the Colorado River and then east. Traveling northeast out of Yuma in 1863, the party discovered gold on Rich Hill. The traditional account describes Peeples picking up $7,000 of loose gold "before breakfast." The miners also discovered nearby placer deposits in Antelope and Weaver creeks. Miners swarmed to the latest boom, erecting the town of Weaver (sometimes called Weaverville) at the foot of Rich Hill (Greeley 1987:17).

Peeples was elected to the Yavapai County Board of Supervisors in 1866-1867. By 1870, he was operating a saloon in Wickenburg, and served as Justice of the Peace in 1877-1879, 1880, and 1882. In 1883, Peeples opened a saloon on Washington Street in Phoenix (Goff 1983:79-80).

Poston, Charles Debrille 1825-1902

Mine owner, promoter, public official. Often termed the "Father of Arizona" for his years of promoting the territory, the Kentucky-born Poston first came west to San Francisco in 1850, and worked as a clerk in a customs house. Four years later, he arrived in Arizona to prospect for gold and silver south of Tucson. He worked with Hermann Ehrenberg to plat the town of Yuma near the fort and sell lots. In 1857, the company he founded with partner Samuel Heintzelman claimed to own more than 80 mines around Tubac, the Santa Rita Mountains, and on the Arivaca Ranch. The lack of water and the high costs of transporting ore caused the Sonora Exploring and Mining Company to abandon the mines. Poston himself took on a paternal role to the Mexican families in Tubac, acting as mayor, justice of the peace and sometime priest in the 1850s.

Poston was one of the five territorial leaders to sign the 1856 petition requesting separate territorial status for Arizona, and when territorial status was granted in 1863, Poston was appointed the first territorial Superintendent of Indian Affairs. Ever the promoter, Poston returned to Arizona from Washington in company with the writer, J. Ross Browne. Poston paid his friend Browne in cash and mine stocks to write a description of their overland journey with special emphasis on the mines of the Sonora Exploring and Mining Company. The resulting book, *A Tour Through Arizona in 1864*, remains a classic account of early Arizona.

Poston was elected the Arizona Territory's first Congressional delegate in 1864. Later, Poston held various government jobs and public offices in Arizona, Texas, Mexico, and Washington, D.C. About 1877, he was appointed registrar of the U. S. Land Office in Florence. While there, he built a road to the top of a butte outside town which came to be called "Poston's Butte" or "Poston's Folly." The modest pension voted for him by the Territorial Legislature in the 1890s did little to relieve his lack of money; he was found dead in his modest adobe house in Phoenix in 1902. Although Poston had asked to be buried on Poston's Butte outside Florence, his destitute state at his death prevented it. In 1925, the D.A.R. raised funds to place Poston's remains under a monument on top of the butte (Barnes 1988:344-345; Goff 1983:81; Young 1970:143-144; Wagoner 1989:388).

Pumpelly, Raphael 1837-1923

Geologist, mining engineer, writer. Born in New York, Pumpelly worked as a mining engineer for the Santa Rita Mines in the late 1850s. In company with Poston, he left Arizona for California in 1861, never to return. As a geologist, he traveled and worked in Japan, later settling in Michigan. His 1870 book describing his adventures in Arizona, *Across America and Asia*, is an important source of information on early southern Arizona (Goff 1983:83).

Ruth, Adolph 1854-1931

Government worker, elderly prospector. Fascinated by tales of gold in the Superstition Mountains, 77-year old retired government worker Adolph Ruth perished of heat exhaustion while trekking alone near Weaver's Needle. The stories that were told of his solitary death and the rumors of his murder illuminate the continuing fascination with gold and the public's ability to conjure legends (Kearney 1991:117-152).

Schieffelin, Edward 1847-1897

Prospector. Prospecting seems to have been the driving force in Schieffelin's entire life. Schieffelin's family left Pennsylvania for the California gold fields in the early 1850s, when he was a very young child. Ed prospected in Oregon, Idaho, Nevada, Montana, and Utah with little success. To support his prospecting, he worked as a teamster, woodcutter, and stage driver. Schieffelin finally struck a bonanza when he located silver in southern Arizona in 1878, naming the claim Tombstone. He took the ore to be assayed at the Signal mine, and there convinced his brother and the assayist Richard Gird to join him at Tombstone. Governor Safford personally supported the effort as a silent partner. Schieffelin and his brother sold their Tombstone mining stock in 1880, clearing $500,000 each.

After the sale, Schieffelin moved to Los Angeles but was soon prospecting again, Over the years, he prospected much of the Pacific Northwest as far north as Alaska. He was found dead in the doorway of his Oregon cabin with a gold pan in his lap; the pan contained grains of gold ore. Schieffelin was buried on the hill outside of Tombstone where he first camped when prospecting the area twenty years before (Barnes 1960:54; Cook 1987:232; Goff 1983:91; Sargent 1988:30).

Swilling, Jack 1830?-1878

Prospector, canal builder. Although Swilling's greatest fame has been associated with his construction of irrigation canals in the Salt River Valley, it is interesting to note his connection with the gold of Arizona. Born in South Carolina, Swilling fought in the Mexican War before coming to California. In 1857, he arrived in Arizona and worked for overland stage lines. After the Civil War, he lived all over the territory, in Ashfork, Wickenburg, Phoenix, Tucson, and Tempe, as he farmed, ranched, or prospected. A member of the Walker party into the gold placers south of Prescott in 1863, Swilling may have convinced some of his fellow miners to invest in his irrigation plans in the Phoenix area (Goff 1983:94).

Walker, Joseph Reddeford 1798-1896

Explorer, guide, gold miner, prospector. An outline of Joseph Walker's life reads like an outline for a movie biography of "the man who opened the American West." Born in the then-frontier state of Tennessee in the first decade of the 1800s, Walker came to Missouri as a young man in 1818. A large man, he was described as "never a braggart, soft spoken, yet capable of maintaining discipline, his sharp eyes sometimes snapped with anger, but more often twinkled with kindly and humane humor" (Goff 1983:99).

As early as 1820, Walker made his way to Santa Fe in New Spain, and was briefly jailed by the Spanish authorities leery of American intruders. In 1824-1825, he headed back to Santa Fe, guiding the first wagon trains from the United States into the now Mexican territory. During the Mexican War, Walker stayed in Missouri, but left his home to join the 49ers rushing to California.

By 1863, the 65-year old Joseph Walker had come to Arizona and organized a prospecting party to explore the new Arizona Territory for gold. The party included King Woolsey, who later gained fame and notoriety as an Indian fighter, and Jack Swilling, who later re-opened Hohokam irrigation canals to the agricultural fields around the new settlement of Phoenix. Walker located gold placer deposits on Lynx Creek, south of present-day Prescott, in 1863. The town of Walker grew up at the site of the gold discoveries on Lynx Creek; other discoveries were made on Turkey Creek and Big Bug Creek. Walker returned to California, where he died in 1876 (Goff 1983:99).

Waltz, Jacob 1810?-1891

Prospector. Fascination with gold created Arizona's greatest legend. Jacob Waltz, the legendary "Lost Dutchman," has engendered much folklore, but few facts are known about his life. It has been claimed that he was born in Germany and that his family fled Europe during the 1848 revolutions. Waltz spent time in St. Louis and California and came to the Arizona Territory sometime before 1864. He prospected in the Superstitions for several years before settling into a modest adobe home in 1889. He died in 1891.

The folklore began with a newspaper article in 1895 describing the lost gold of Jacob Waltz, supposedly cached in the Superstition Mountains east of Phoenix. The alleged location near Weaver's Needle of the "Lost Dutchman Mine," a name coined by a local rancher in the

1890s, is not close to any major known gold deposits. However, the continuing appeal of the Dutchman's lost gold is evident in the extensive bibliography of books exploring the legend, and on the signs and billboards of the tourist town of Apache Junction. Modern prospectors continue to risk their own health and savings to search for Jacob Waltz's gold (Goff 1983:99; Kearney 1992:117-152).

Weaver, Pauline/Paulino 1800?-1867

Mountain man, guide, prospector. Son of a white man and a Cherokee mother, Weaver was of the same generation as Joseph Walker, and just as rugged. Born in Tennessee, Weaver trapped beaver for the Hudson's Bay Company in Canada in the 1820s. In 1829 or 1830, he came south to a warmer climate to trap beaver in Arizona. Traveling to Tucson and Tubac, he is said to have carved his name into the adobe of the Casa Grande ruin.

His familiarity with Arizona made Weaver a welcome guide to the Mormon Battalion in 1846-1847, the Boundary Commission in the early 1850s, and the surveyors of the northern part of the state, Captain Lorenzo Sitgreaves (1851) and Lieutenant Amiel W. Whipple (1853-1854).

In 1862, Weaver discovered placer gold at La Paz, about 150 miles upstream from Yuma on the Colorado River. The next year, Abraham Harlow Peeples hired Weaver to guide a prospecting party. Traveling northeast out of Yuma in 1863, the party discovered gold on Rich Hill. An unusual placer deposit, the gold was found on top of the hill rather than in a streambed. The miners also discovered nearby placer deposits in Antelope and Weaver creeks. Miners swarmed to the latest boom, erecting the town of Weaver (sometimes called Weaverville) at the foot of Rich Hill. Living on the Hassayampa River in 1864, Weaver was described as "deep-voiced, robust, with broad shoulders, black eyes, a beard, and long hair" (Goff 1983:100).

In the last years of his life, Weaver continued as a guide at Fort Whipple, Fort McDowell, and Camp Lincoln, all in the Arizona Territory. He died in 1867. In 1929, his remains were re-buried at the Sharlot Hall Museum in Prescott (Goff 1983:100).

Wickenburg, Henry 1820?-1905

Mining engineer, prospector, mine owner. Born in Prussia or Austria, Henry Wickenburg was trained in geology and mineralogy in Europe. Arriving in New York in 1847, he soon traveled around the Horn to California in 1851, working as a fireman on board ship. By 1862, he had come to Arizona and worked the placers of the Colorado River with Peeples, Swilling, and Weaver at La Paz. A member of the Peeples party that discovered Rich Hill, Wickenburg struck out prospecting on his own and discovered the Vulture gold lode. A camp established 13 miles from the mine grew into Wickenburg.

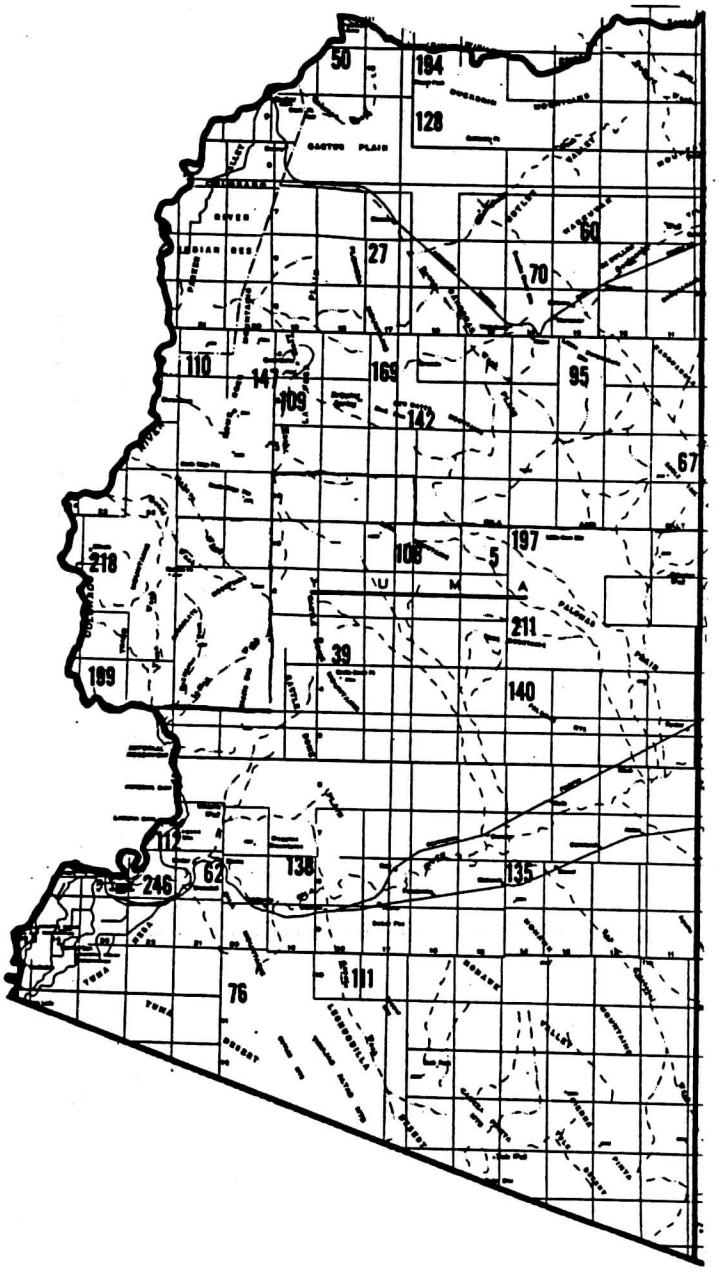
An investor from Philadelphia purchased four-fifths interest in the Vulture Mine in 1866, providing the capital to build a 20-stamp mill on the Hassayampa River. By 1870, Wickenburg had sold all his interest in the Vulture, receiving $85,000; he is said to have

invested some of his proceeds into Jack Swilling's irrigation projects in the Salt River Valley. By 1895, Henry Wickenburg operated a general store in the town that bore his name. In 1905, his body was found in his farm house outside town and his death was ruled a suicide (Goff 1983:103).

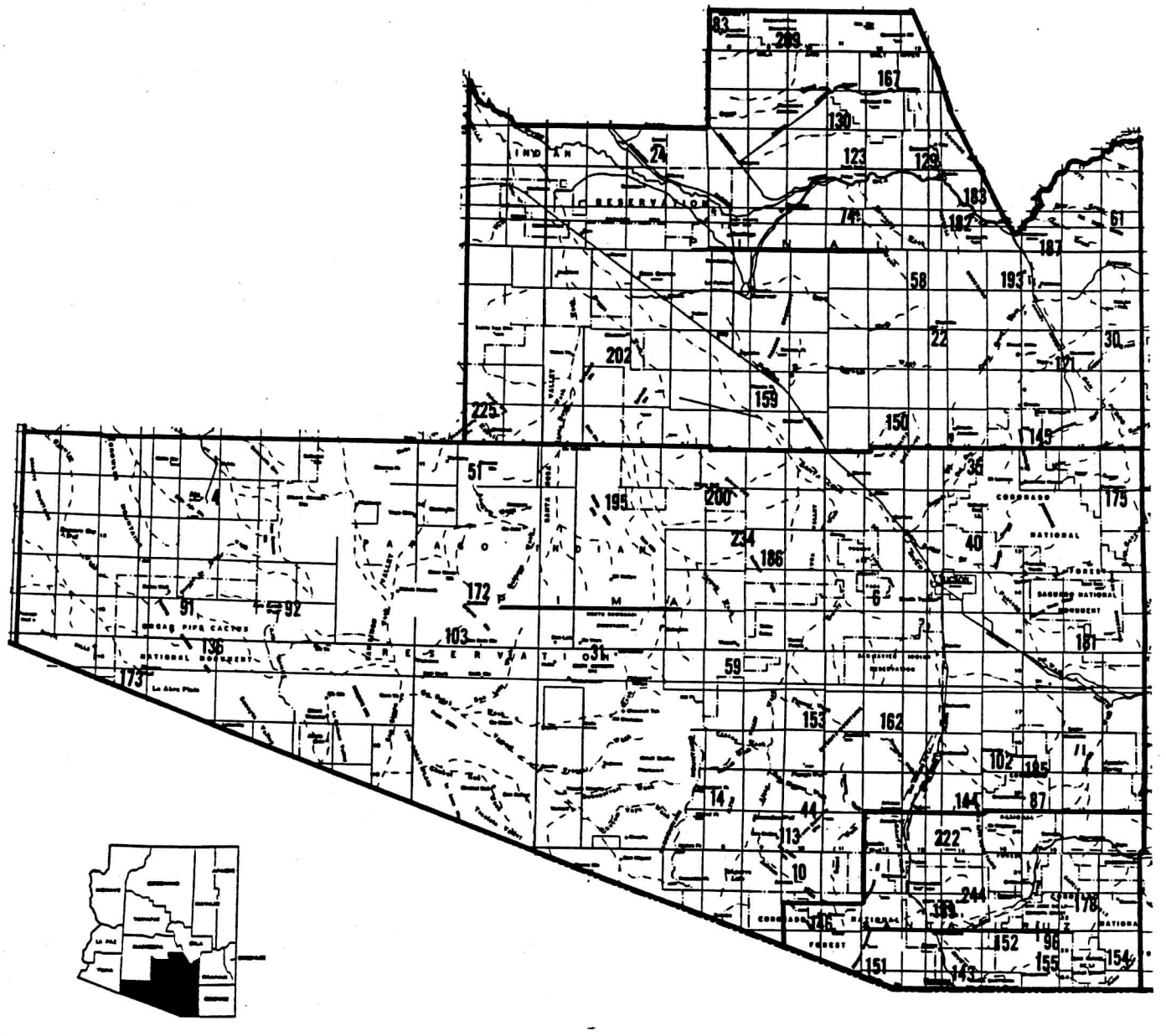
APPENDIX 4
HISTORIC MINING DISTRICTS IN ARIZONA

Mines, mills, and mining communities in Arizona are often identified by mining district. Mining districts are quasi-political entities created by isolated mining communities as a form of self-government, each district drawing up its own laws and mining regulations (similar to the incorporation of a new town). Because mining districts may, but do not necessarily, assume the same name as the chief mine of the district, and because some of the 246 mining districts in Arizona have been known by several names over the last 150 years, this appendix becomes a helpful tool in identifying Arizona mines.

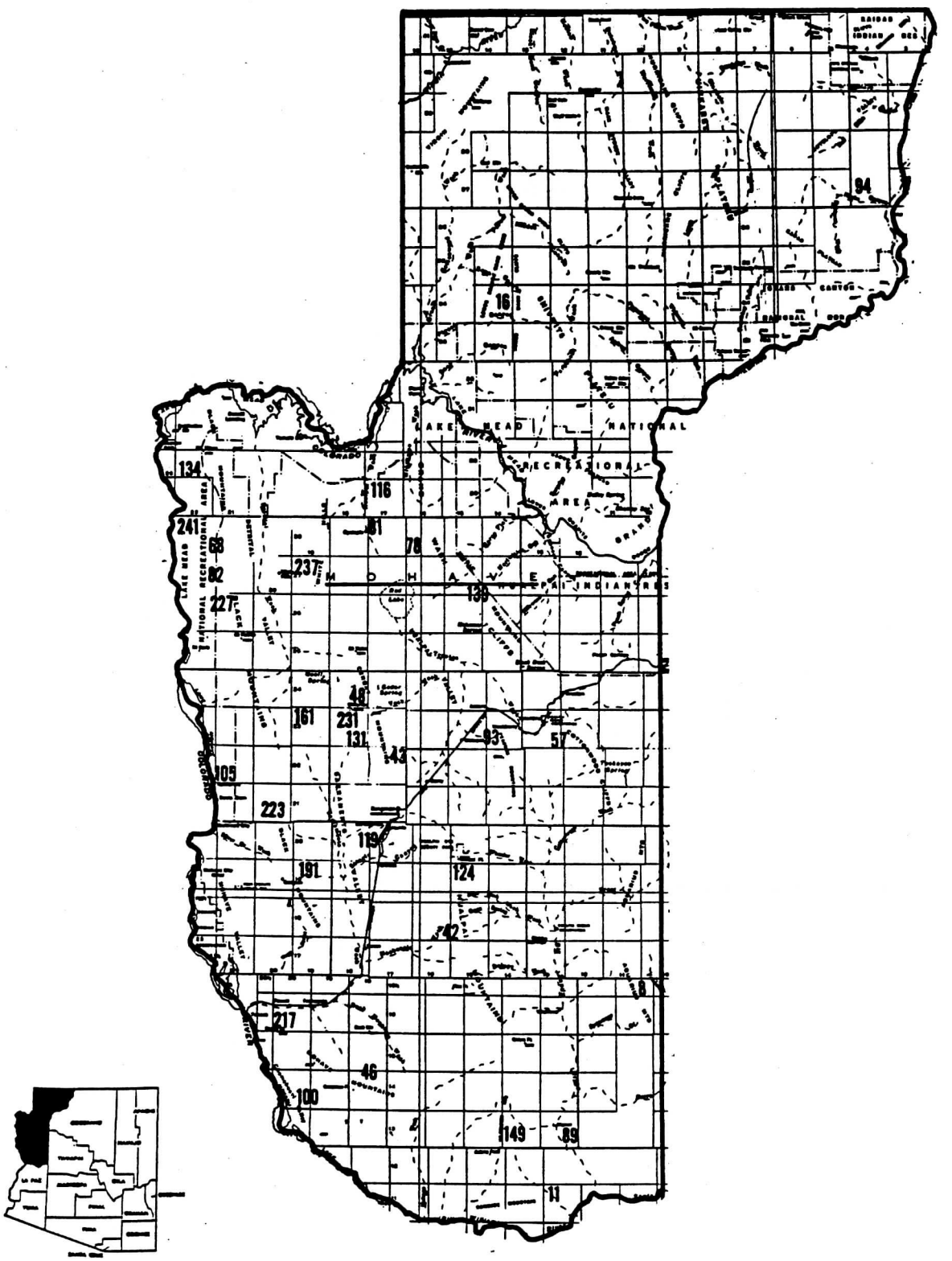
The following set of county maps drawn in 1961 locates all 246 historic mining districts in Arizona. Each district is indicated by a number on the county map; the index following the maps lists the mining districts in numerical and alphabetical order (see pages 122-124).



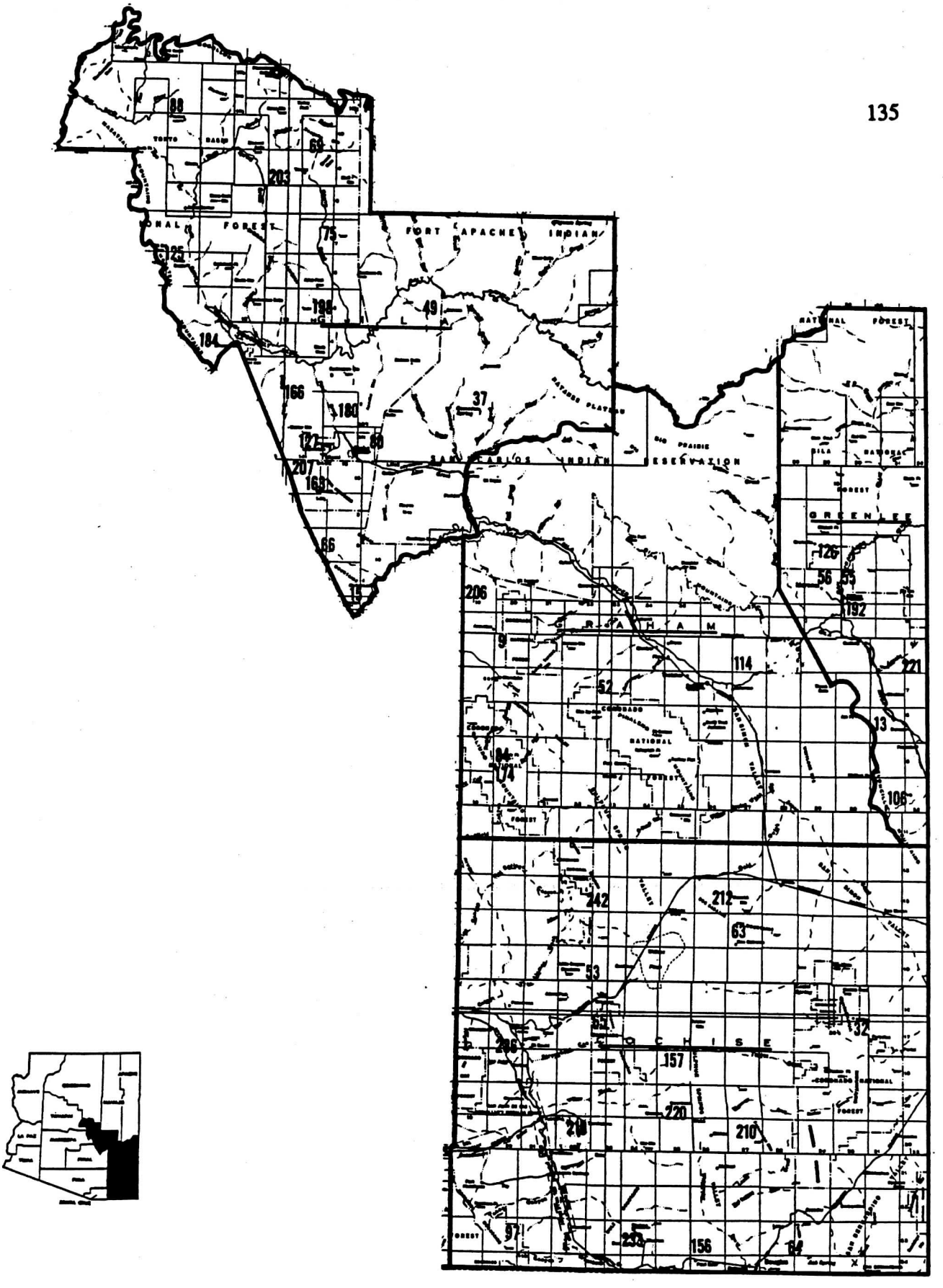
Historic Mining Districts in Yuma and La Paz Counties



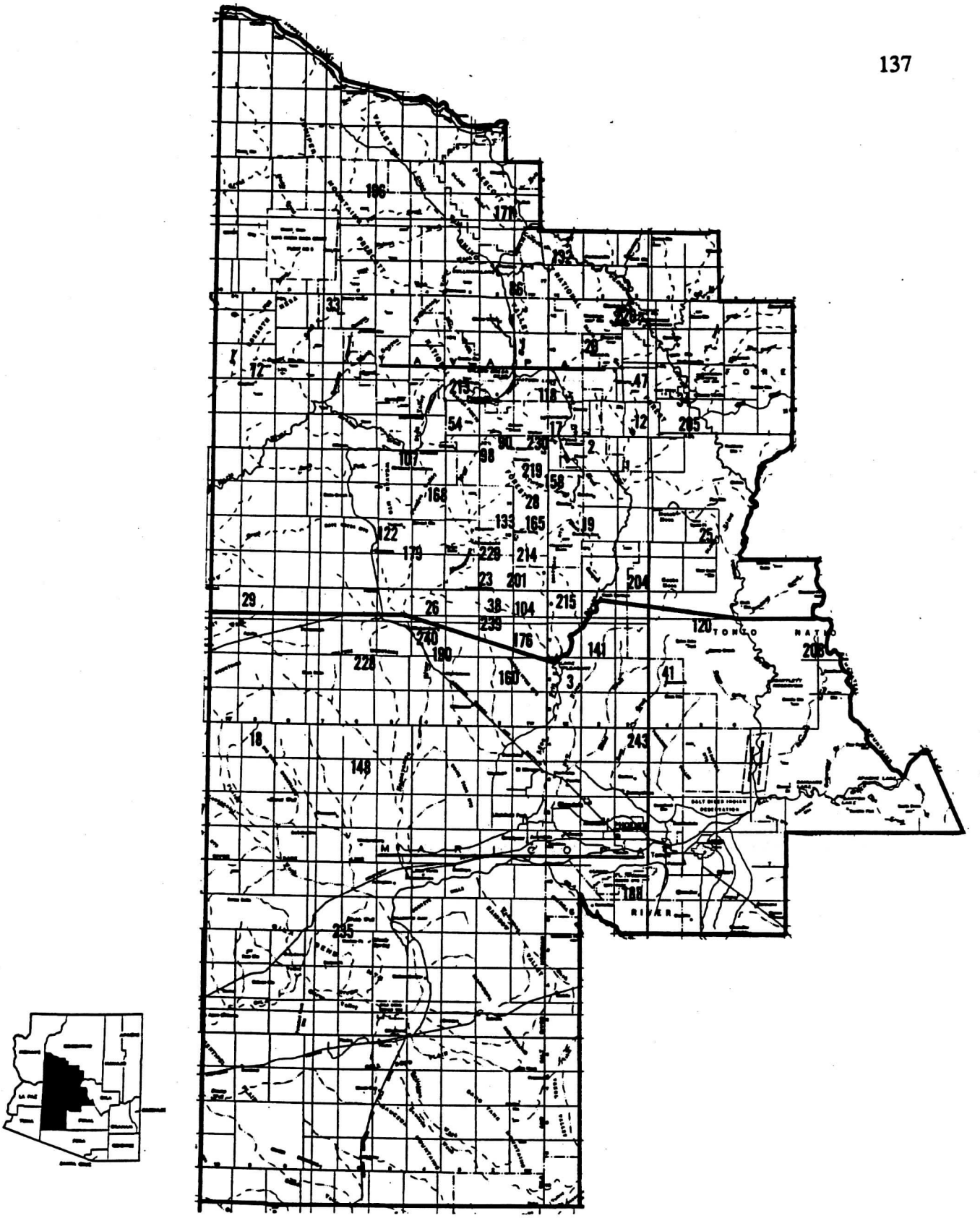
Historic Mining Districts in Pima, Pinal, and Santa Cruz Counties



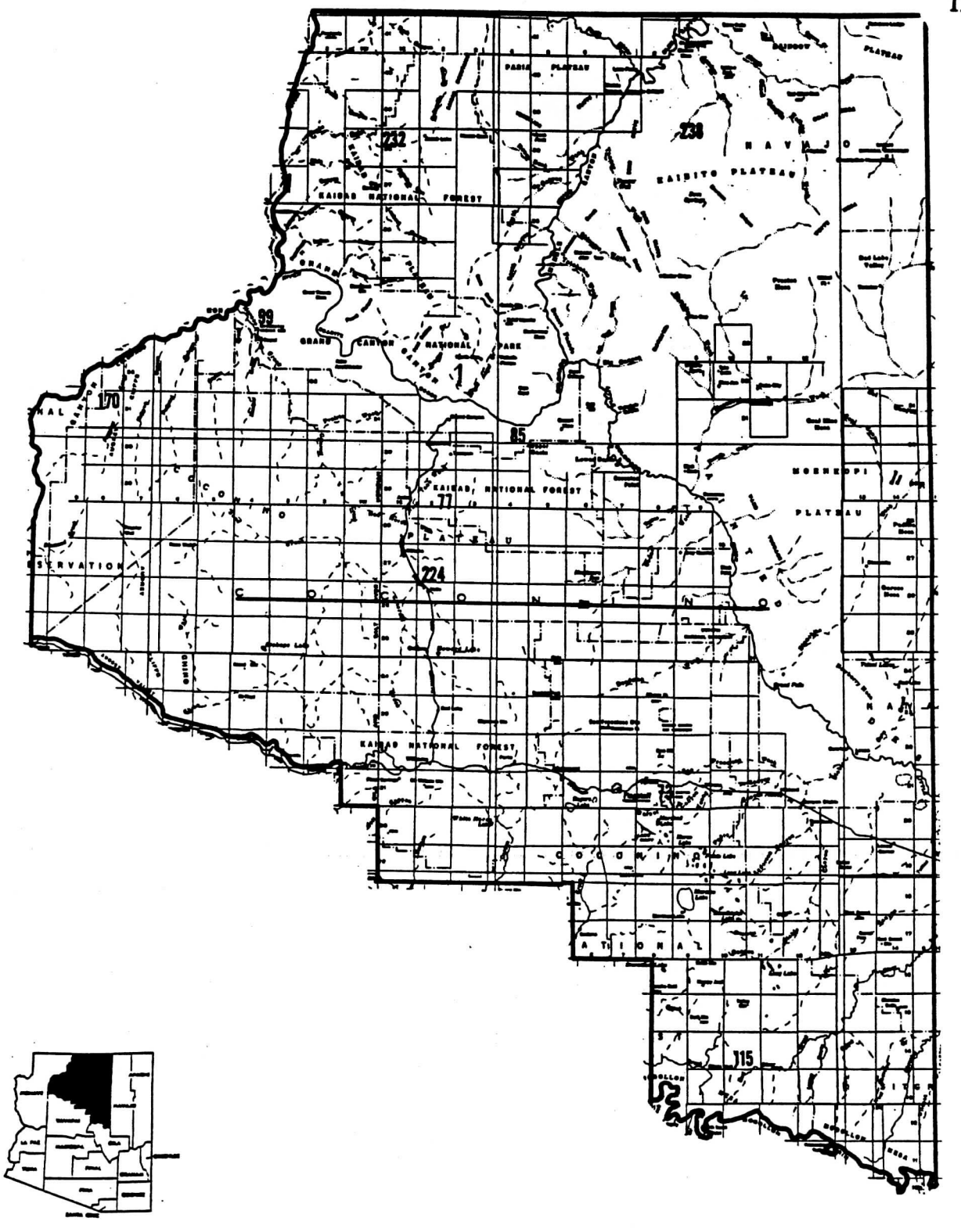
Historic Mining Districts in Mohave County



Historic Mining Districts in Cochise, Graham, Gila, and Greenlee Counties



Historic Mining Districts in Yavapai and Maricopa Counties



Historic Mining Districts in Coconino County

Historic Mining Districts
in Navajo and Apache Counties

APPENDIX 5:
MINES IN THE HISTORIC INVENTORY

The following six pages list those properties in the State Historic Preservation Office statewide inventory. The list of 41 properties was created by searching the inventory for properties with the word "mine" in their records. Management status of each of these properties is shown; NR indicates that the property is listed on the National Register of Historic Places, CE indicates that the property is considered eligible for the National Register, and NEV indicates that the National Register status of the property has not been evaluated.

Historic Property Name: Cedar Mine **Common Name:**
County: 015 **Place:** T16N, R15W, Sec 1 **Number of Acres:**
Time(Con/Mod Dates): **Managment Status:** NEV **Inventory Number:** 76
Number of Properties: **SHPO #:** **Category:** ☒ Historic ☐ Historic Archaeology
Miscellaneous: Only superficial shaft remains

Historic Property Name: COD Mine **Common Name:**
County: 015 **Place:** T23N, R17W, Sec 34 **Number of Acres:**
Time(Con/Mod Dates): c1878 **Managment Status:** NEV **Inventory Number:** 4
Number of Properties: **SHPO #:** **Category:** ☒ Historic ☐ Historic Archaeology
Miscellaneous: Ruins only

Historic Property Name: Commonwealth Mine **Common Name:**
County: 003 **Place:** T18S, R25E, Sec 5 **Number of Acres:**
Time(Con/Mod Dates): c1895 **Managment Status:** NEV **Inventory Number:** 10a
Number of Properties: **SHPO #:** **Category:** ☒ Historic ☐ Historic Archaeology
Miscellaneous: Pearce vicinity

Historic Property Name: Copper Mountain Mine **Common Name:**
County: 019 **Place:** T15S, R5W ... Kino Peak **Number of Acres:**
Time(Con/Mod Dates): 1949 **Managment Status:** NEV **Inventory Number:** 82
Number of Properties: **SHPO #:** **Category:** ☒ Historic ☐ Historic Archaeology
Miscellaneous: Not accessible to the public.

Historic Property Name: Feldspar Mine Rock House **Common Name:**
County: 015 **Place:** T22N, R17W, Sec 26, NE, **Number of Acres:**
Time(Con/Mod Dates): **Managment Status:** NEV **Inventory Number:** 58
Number of Properties: **SHPO #:** **Category:** ☒ Historic ☐ Historic Archaeology
Miscellaneous:

Historic Property Name: Fortuna Mine and Mining Camp **Common Name:**
County: 027 **Place:** T10S, R20W, Sec 16, 17 **Number of Acres:**
Time(Con/Mod Dates): 1894 **Managment Status:** NEV **Inventory Number:** 9
Number of Properties: **SHPO #:** **Category:** ☐ Historic ☒ Historic Archaeology
Miscellaneous:

Historic Property Name: Globe Mine Rescue Station **Common Name:**
County: 007 **Place:** Globe **Number of Acres:**
Time(Con/Mod Dates): 1920 **Managment Status:** CE **Inventory Number:** 135
Number of Properties: **SHPO #:** **Category:** ☒ Historic ☐ Historic Archaeology
Miscellaneous: Good integrity. Currently used as a museum.

Historic Property Name: Gold King Mine **Common Name:** Stiekler, Joseph, Mine
County: 015 **Place:** T19N, R15W, Sec 14 **Number of Acres:**
Time(Con/Mod Dates): c1920 **Managment Status:** NEV **Inventory Number:** 17
Number of Properties: **SHPO #:** **Category:** ☒ Historic ☐ Historic Archaeology
Miscellaneous:

Historic Property Name: Grand Gulch Copper Mine **Common Name:**
County: 015 **Place:** T34N, R14W, Sec 21 **Number of Acres:**
Time(Con/Mod Dates): 1876 **Managment Status:** NEV **Inventory Number:** 19
Number of Properties: **SHPO #:** **Category:** ☒ Historic ☐ Historic Archaeology
Miscellaneous: Ruins remain

Historic Property Name: Grandview Mine **Common Name:** Last Chance Mine
County: 005 **Place:** Grand Canyon **Number of Acres:** 62
Time(Con/Mod Dates): 1893 **Managment Status:** NR **Inventory Number:** 9 1/2
Number of Properties: 1 **SHPO #:** **Category:** ☒ Historic ☐ Historic Archaeology
Miscellaneous: Copper mine was accessed by the Grandview Trail and was located 3000 feet below the canyon rim.

Historic Property Name: Harqua Hala Mine **Common Name:**
County: 012 **Place:** T4N, R13W, Sec 21 **Number of Acres:**
Time(Con/Mod Dates): c1889 **Managment Status:** NEV **Inventory Number:** 12
Number of Properties: **SHPO #:** **Category:** ☐ Historic ☒ Historic Archaeology
Miscellaneous: Ruins and some buildings remain

Historic Property Name: Hi Henry Mine **Common Name:**
County: 027 **Place:** T15, R17W, Sec 36 NW 1/4 **Number of Acres:**
Time(Con/Mod Dates): 1909 **Managment Status:** NEV **Inventory Number:** 14
Number of Properties: **SHPO #:** **Category:** ☐ Historic ☒ Historic Archaeology
Miscellaneous: Ruins remain

Historic Property Name: Hilltop Tunnel and Mine **Common Name:**
County: 003 **Place:** T16S, R30E, Sec 33 **Number of Acres:**
Time(Con/Mod Dates): c1880/1913 **Managment Status:** NEV **Inventory Number:** 28
Number of Properties: **SHPO #:** **Category:** ☐ Historic ☒ Historic Archaeology
Miscellaneous: Mine in c1880: developed into a town in 1913

Historic Property Name: Lavender Pit Mine **Common Name:**
County: 003 **Place:** T23S, R24E, Sec 15,16 **Number of Acres:**
Time(Con/Mod Dates): 1951 **Managment Status:** NEV **Inventory Number:** 5b
Number of Properties: **SHPO #:** **Category:** ☒ Historic ☐ Historic Archaeology
Miscellaneous: Located in the Bisbee vicinity

Historic Property Name: Lost Cabin Mine **Common Name:**
County: 019 **Place:** T17S, R6W ... Lukeville **Number of Acres:**
Time(Con/Mod Dates): **Managment Status:** NEV **Inventory Number:** 52
Number of Properties: **SHPO #:** **Category:** ☒ Historic ☐ Historic Archaeology
Miscellaneous:

Historic Property Name: Lucky Cuss Mine **Common Name:**
County: 003 **Place:** Tombstone **Number of Acres:**
Time(Con/Mod Dates): c1877 **Managment Status:** CE **Inventory Number:** 31a
Number of Properties: **SHPO #:** **Category:** ☒ Historic ☐ Historic Archaeology
Miscellaneous:

Historic Property Name: Magma Mine Air Conditioning System **Common Name:**
County: 021 **Place:** Superior vicinity **Number of Acres:**
Time(Con/Mod Dates): 1937 **Managment Status:** NEV **Inventory Number:** 46
Number of Properties: **SHPO #:** **Category:** ☒ Historic ☐ Historic Archaeology
Miscellaneous: The site of the first use of air conditioning to cool a mine.

Historic Property Name: Martinez Mine **Common Name:**
County: 019 **Place:** T17S, R6W ... Lukeville **Number of Acres:**
Time(Con/Mod Dates): c1917 **Managment Status:** NEV **Inventory Number:** 97
Number of Properties: **SHPO #:** **Category:** ☒ Historic ☐ Historic Archaeology
Miscellaneous: Currently unused and inaccessible to public.

Historic Property Name: Mascot Mine **Common Name:**
County: 003 **Place:** Dos Cabezas **Number of Acres:**
Time(Con/Mod Dates): 1915 **Managment Status:** NEV **Inventory Number:** 65
Number of Properties: **SHPO #:** **Category:** ☒ Historic ☐ Historic Archaeology
Miscellaneous: Associated buildings are located on site

Historic Property Name: McCracken & Signal Mines **Common Name:** Signal Mine
County: 015 **Place:** T13N, R15W, Sec 25 **Number of Acres:**
Time(Con/Mod Dates): c1875 **Managment Status:** NEV **Inventory Number:** 26
Number of Properties: **SHPO #:** **Category:** ☒ Historic ☐ Historic Archaeology
Miscellaneous: Production stopped 1906

Historic Property Name: Miner's camp **Common Name:**
County: 021 **Place:** T3S, R13E, Sec 36 **Number of Acres:**
Time(Con/Mod Dates): c 1870 **Managment Status:** CE **Inventory Number:** 146
Number of Properties: **SHPO #:** 3269 **Category:** ☒ Historic ☐ Historic Archaeology
Miscellaneous: Poss. tent platform, glass, cans, button, tool, sheet metal

Historic Property Name: Mineral Belt Railroad Tunnel **Common Name:**
County: 007 **Place:** T12N, R10E, Sec 1 **Number of Acres:**
Time(Con/Mod Dates): c1881 **Managment Status:** NEV **Inventory Number:** 44
Number of Properties: **SHPO #:** **Category:** ☒ Historic ☐ Historic Archaeology
Miscellaneous: Tunnel never completed; goal to connect Globe/Flagstaff RR

Historic Property Name: Mineral Building **Common Name:** Arizona Minerial Museum
County: 013 **Place:** Phoenix **Number of Acres:**
Time(Con/Mod Dates): 1917 **Managment Status:** NEV **Inventory Number:** 2844
Number of Properties: **SHPO #:** **Category:** ☒ Historic ☐ Historic Archaeology
Miscellaneous:

Historic Property Name: Mineral Hill **Common Name:**
County: 019 **Place:** T16S, R12E, Sec 35 **Number of Acres:**
Time(Con/Mod Dates): c1880/c195 **Managment Status:** NEV **Inventory Number:** 56
Number of Properties: **SHPO #:** **Category:** ☒ Historic ☐ Historic Archaeology
Miscellaneous:

Historic Property Name: Mineral Park **Common Name:**
County: 015 **Place:** T23N, R18W, Sec 24 **Number of Acres:**
Time(Con/Mod Dates): c1871 **Managment Status:** NEV **Inventory Number:** 27a
Number of Properties: **SHPO #:** **Category:** ☐ Historic ☒ Historic Archaeology
Miscellaneous: Ruins and small cemetery remain

Historic Property Name: Moss Mine **Common Name:**
County: 015 **Place:** T20N, R20W, Sec 19 SE **Number of Acres:**
Time(Con/Mod Dates): c1863 **Managment Status:** NEV **Inventory Number:** 30
Number of Properties: **SHPO #:** **Category:** ☒ Historic ☐ Historic Archaeology
Miscellaneous:

Historic Property Name: Mowery Mine **Common Name:** Mowery Townsite
County: 023 **Place:** T23S, R16E, Sec 15 **Number of Acres:**
Time(Con/Mod Dates): c1857 **Managment Status:** NEV **Inventory Number:** 15
Number of Properties: **SHPO #:** **Category:** ☒ Historic ☐ Historic Archaeology
Miscellaneous:

Historic Property Name: Peck Mine **Common Name:**
County: 025 **Place:** Yavapai County **Number of Acres:**
Time(Con/Mod Dates): c1875 **Managment Status:** NEV **Inventory Number:** 151
Number of Properties: **SHPO #:** **Category:** ☒ Historic ☐ Historic Archaeology
Miscellaneous:

Historic Property Name: Salero Mine **Common Name:**
County: 023 **Place:** Tumacacori vicinity **Number of Acres:**
Time(Con/Mod Dates): c1860 **Managment Status:** NEV **Inventory Number:** 21
Number of Properties: **SHPO #:** **Category:** ☐ Historic ☒ Historic Archaeology
Miscellaneous: Also mined by Jesuits in 17th century through 1823

Historic Property Name: Silver Bell Mine **Common Name:**
County: 021 **Place:** Martinez Canyon, Florence **Number of Acres:**
Time(Con/Mod Dates): c1860 **Managment Status:** NEV **Inventory Number:** 124
Number of Properties: **SHPO #:** **Category:** ☒ Historic ☐ Historic Archaeology
Miscellaneous: A nineteenth century mine in excellent condition.

Historic Property Name: Silver King Mine Superintendent's Office **Common Name:**
County: 021 **Place:** T1S, R12E, Sec 24 NW4, **Number of Acres:**
Time(Con/Mod Dates): **Managment Status:** **Inventory Number:** 41
Number of Properties: **SHPO #:** **Category:** ☒ Historic ☐ Historic Archaeology
Miscellaneous:

Historic Property Name: Toughnut Mine **Common Name:**
County: 003 **Place:** Tombstone **Number of Acres:**
Time(Con/Mod Dates): c1877 **Managment Status:** CE **Inventory Number:** 31g
Number of Properties: **SHPO #:** **Category:** ☒ Historic ☐ Historic Archaeology
Miscellaneous:

Historic Property Name: Vulture Mine **Common Name:**
County: 013 **Place:** T6N, R6W, Sec 36 SE 1/4 **Number of Acres:**
Time(Con/Mod Dates): c1863 **Managment Status:** NEV **Inventory Number:** 70b
Number of Properties: **SHPO #:** **Category:** ☐ Historic ☒ Historic Archaeology
Miscellaneous:

Historic Property Name: Vulture Mine Historic District **Common Name:**
County: 013 **Place:** Wickenburg vicintiy **Number of Acres:**
Time(Con/Mod Dates): c1865 **Managment Status:** NEV **Inventory Number:** 7A
Number of Properties: **SHPO #:** **Category:** ☒ Historic ☐ Historic Archaeology
Miscellaneous:

Historic Property Name: Ciudad, San Ysidro; Irondoor Mine; Nueva **Common Name:** Irondoor Mine; Escalante
County: 021 **Place:** T10S, R14E, Sec 13 and **Number of Acres:** 5
Time(Con/Mod Dates): c1717 **Managment Status:** CE **Inventory Number:** 176
Number of Properties: **SHPO #:** **Category:** ☒ Historic ☒ Historic Archaeology
Miscellaneous: Site contains three areas with apparent waste dumps and man-made ditches.

Historic Property Name: New Cornelia Mine **Common Name:**
County: 019 **Place:** Ajo vic. **Number of Acres:**
Time(Con/Mod Dates): c1854 **Managment Status:** **Inventory Number:** 1137
Number of Properties: **SHPO #:** **Category:** ☒ Historic ☐ Historic Archaeology
Miscellaneous:

Historic Property Name: Growler Mine Area **Common Name:**
County: 019 **Place:** T14S, R7W, Secs27, 34, **Number of Acres:** 500
Time(Con/Mod Dates): 1880s, **Managment Status:** NR **Inventory Number:** 105
Number of Properties: **SHPO #:** **Category:** ☐ Historic ☒ Historic Archaeology
Miscellaneous: Virtually nothing remains today of the buildings and structures once associated with the site. Site is dotted with numerous test shafts and prospect holes.

Historic Property Name: Milton Mine **Common Name:**
County: 019 **Place:** Organ Pipe Cactus National **Number of Acres:** 2
Time(Con/Mod Dates): 1911/1917/1 **Managment Status:** NR **Inventory Number:** 55
Number of Properties: **SHPO #:** **Category:** ☐ Historic ☒ Historic Archaeology
Miscellaneous:

Historic Property Name: Victoria Mine **Common Name:** La Americana Mine
County: 019 **Place:** T17S, R6W; Organ Pipe **Number of Acres:** 2
Time(Con/Mod Dates): 1880/1899/1 **Managment Status:** NR **Inventory Number:** 72
Number of Properties: **SHPO #:** **Category:** ☐ Historic ☒ Historic Archaeology
Miscellaneous: Surviving structures include a dilapidated stone building, a rock lean-to shelter, a concrete cistern, a stone stairway, some headfram timbers, and a large shaft hole.

Historic Property Name: Miedreich Mine **Common Name:**
County: 025 **Place:** T14N, R4E, Sec18 **Number of Acres:** Less
Time(Con/Mod Dates): **Managment Status:** NEV **Inventory Number:** 216
Number of Properties: **SHPO #:** **Category:** ☒ Historic ☐ Historic Archaeology
Miscellaneous:

Historic Property Name: Mineral Creek Luten Arch Bridge **Common Name:**
County: 021 **Place:** T3S, R13E, Sec36, SW4 **Number of Acres:**
Time(Con/Mod Dates): **Managment Status:** **Inventory Number:** 108
Number of Properties: 1 **SHPO #:** **Category:** ☒ Historic ☐ Historic Archaeology
Miscellaneous:

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