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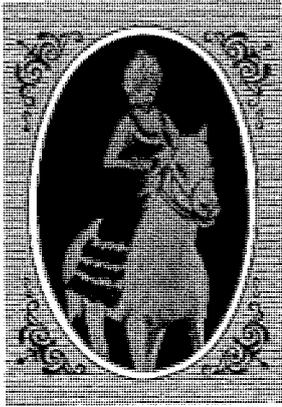
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# ASARCO SILVER BELL MINE



# The History of Silver Bell or the Taming of the Toughest Town in Pima County!



The name Silver Bell conjures up visions of things delicate and beautiful. Don't let it! As late as January 12th, 1908, the Tucson Citizen newspaper noted that this prosperous mining town was weary of being known as the toughest town in Pima County "where hell breaks forth every pay day." There was a time

when Silver Bell rivaled or even surpassed Tombstone, "the town too tough to die," in omeriness. Indeed, it was called "the hell hole of Arizona."

## The naming of Silver Bell

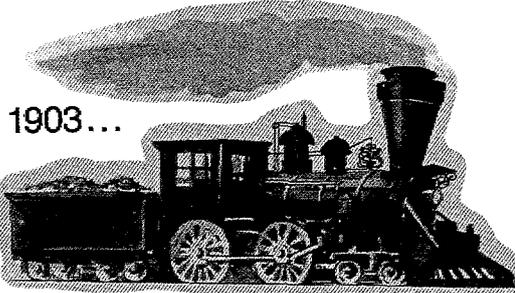
With such a dubious reputation, how did Silver Bell acquire its lovely name? No one knows for sure. Some say it comes from a desert flower; others claim it's the namesake of Belle Carruthers, a lady of the Old West often seen riding through town on a silver horse; still another story tells of an awesomely beautiful dance hall girl named Belle whose hair turned prematurely grey. We'll probably never really know which story is closest to the truth (if any of them!) because no one is quite sure when Silver Bell was born. But few mines have an older or livelier history than this one!

## Its first years

The names of its first prospectors are unknown. There are reports of the general area being worked by Spanish padres seeking copper and silver sometime in the 1700s. In the early 1860s, a few mining sites were excavated, but the metal content was too low and transportation too difficult and costly to

make mining profitable. However, in about 1865, higher grade oxidized copper ore was selectively mined and hauled from the district by wagon.

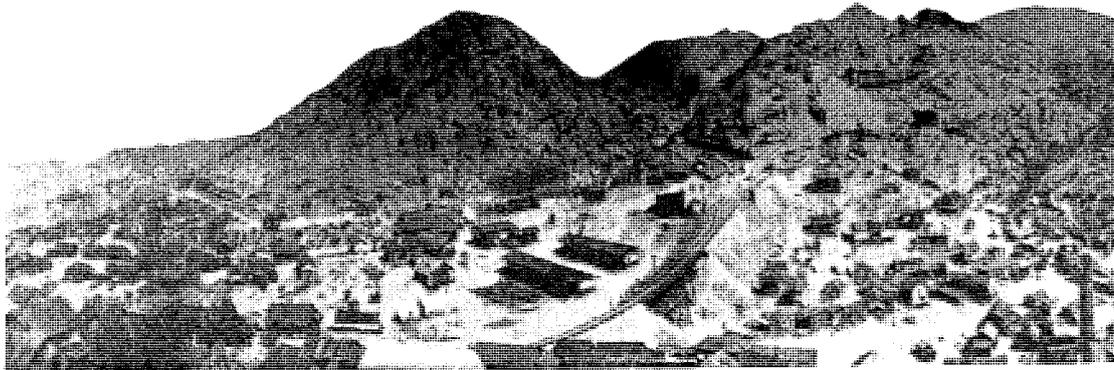
In the 1880s, teams loaded with lumber, merchandise and supplies were constantly arriving, and the influx of prospectors and would-be investors continually increased. But lack of water was always a problem and transportation costs were high. Miners suffered terribly from the heat and there was a great deal of sickness in the camps.

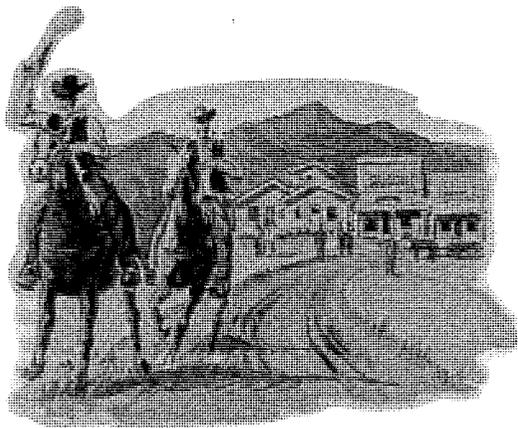


In 1903, the Imperial Copper Company started a new townsite with shacks, tents and lean-tos. The Southern Arizona Railroad built a rail-line connecting the Southern Pacific main line at Red Rock with the mines at Silver Bell in 1904. The town grew to a population of about 1000, and included: one grocery store, two saloons, a dairy, a justice of the peace and a notary public. The Silver Bell Post Office was established on August 8th of that same year.

The years 1906 and 1907 were boom years for Silver Bell. Optimism ran high. So did lawlessness, greed, drunken brawls, stabbings and killings. Doctor Mead Clyne, who supervised the doctors at Silver Bell, had a small glass jar over half full of lead bullets that had been removed from various "patients" in Silver Bell.

In 1911, a bad shaft fire at Silver Bell, low copper prices, and a shortage of water at other properties





caused the Development Company of America to go bankrupt and cease operations at its Imperial Copper Company subsidiary in Silver Bell. This was a blow to the camp; the only businesses to survive were a grocery store and a saloon.

## Asarco

In 1915, the American Smelting and Refining Company (now known as ASARCO Incorporated) acquired the Imperial Copper Company. The properties were operated by underground methods during the First World War. Silver Bell grew to a town of over 1200 and boasted the advantages of having both a school and a hospital.

But the good years were short ones. In 1921, the price of copper dropped dramatically and so did production.

## The 30s

With low copper prices continuing through the roaring twenties and into the Great Depression, Silver Bell almost became a ghost town. The population dropped from 500 in 1930 to 45 in 1931. By 1932, the price of copper had sunk to a low of 5¢ a pound.



In 1934, all the machinery and equipment at the Imperial Copper Smelter, plus the rails to Red Rock, were dismantled and sold for junk.

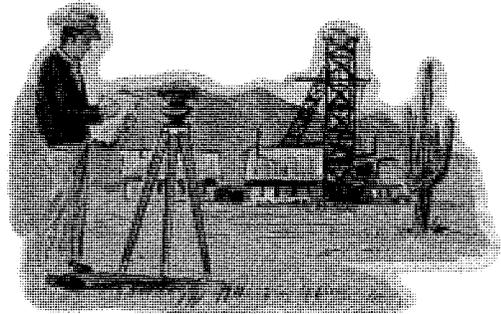
The ghost of Silver Bell haunted the territory. But Silver Bell refused to die, and once again copper prices began to ascend.

## The 40s and 50s

In 1940, Asarco acquired additional property and brought the major portion of the district under the control of one company. With the increase in copper prices and the advances in engineering methods and equipment, large low-grade ore deposits became of economic interest.

In 1946, Asarco undertook an extensive geologic exploration and churn drilling program to check former drilling. Detailed plans were made to mine these deposits by modern open-pit methods. The outbreak of the Korean War brought U.S. Government inducements to increase output of copper.

Initial stripping was started in December, 1951. Construction of the concentrator was begun in February of 1952. The first ore was processed in March of 1954. Operations have continued ever since. A new town was established about four miles southeast of the Old Silver Bell townsite.

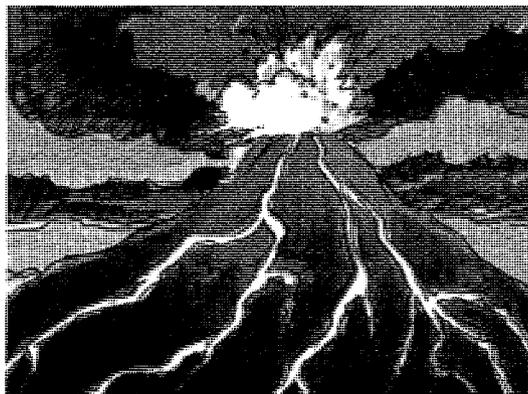


## Today

Today's Silver Bell has a population of approximately 800. There are 175 houses, 30 trailer spaces, 24 apartments and 20 bunkhouse rooms. If the ghost of Silver Bell were to walk its streets today, it would enjoy the pleasures of a general store, post office, recreation hall, barber and beauty shop, swimming pool, baseball diamond, tennis and basketball courts. Asarco employs over 300 workers, one-third of whom live outside Silver Bell in surrounding areas and in Tucson.

It is a pretty setting for a town with a pretty name. In the short years since its establishment trees, flowers and shrubbery have softened Silver Bell's residential contours. Silver Bell now is a quiet, peaceful community. The "hell hole of Arizona" exists only in its legendary history.

# The copper Asarco is mining today had its beginnings 75 million years ago!



The Silver Bell deposit is located along the northwest-trending Silver Bell Fault Zone, which served as a channelway for the intrusion by igne-

ous rocks 75 million years ago. Violent volcanic activity caused thick layers of volcanic debris and large chambers of magma to accumulate at great depths beneath the surface. Copper-rich fluids were ejected from the magma as it solidified. The fluids were then guided upward along the Silver Bell Fault Zone and toward the tops of the magma chambers. As the fluids pushed toward the surface, they produced an intense network of fractures into which the copper minerals were deposited. Silver Bell's Oxide and El Tiro pits are on sites which accumulated higher values of copper mineralization. Extensive erosion of the volcanic debris exposed the solidified magma and copper minerals on the surface. Surface weathering conditions resulted in redeposition of the copper as chalcocite. The formation of chalcocite made it economically feasible to mine copper at Silver Bell.

## The lay of the land

Asarco's Silver Bell property lies to the west of Arizona's broad Avra Valley (bottom photo). The land slopes gently for nine miles from the valley floor, at elevation 2020 feet, up to the town of Silver Bell. The mill site is 100 feet higher than the town, and at this point the grade increases sharply to a ridge of 3315 feet which stands as a natural curtain between the Oxide pit and the plant.

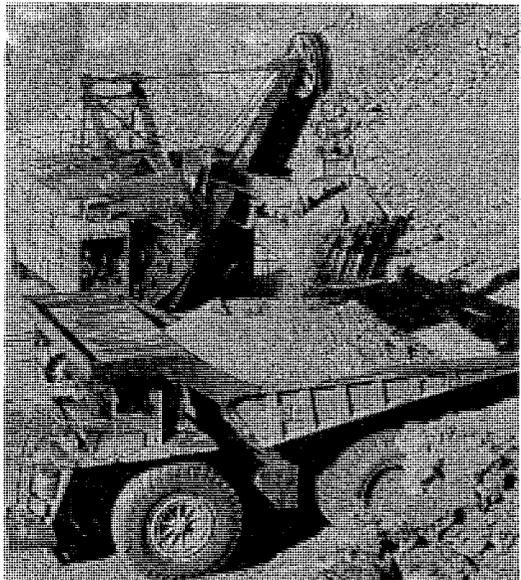
Silver Bell's two ore bodies are separated by two and one-half miles. The El Tiro pit is approximately one mile long and one-half mile wide. The pit is laid out in 40 foot benches, with haulage roads throughout. The Oxide pit is approximately three-quarters of a mile long and one-half mile wide.



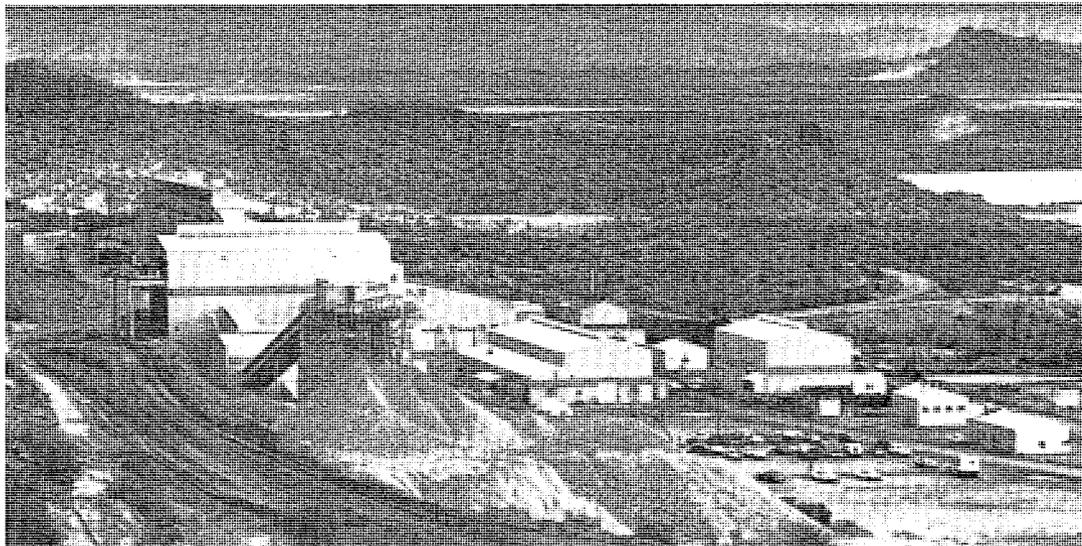
# Blasting and Mining



Blasting (above) frees the ore, which is loaded onto large ore haulers (bottom right) to be taken to the crusher. There are 23 trucks at Silver Bell with hauling capacities of 75 tons. Loading equipment includes 4 five-yard shovels, 1 seven-yard shovel and 2 fifteen-yard front-end loaders.



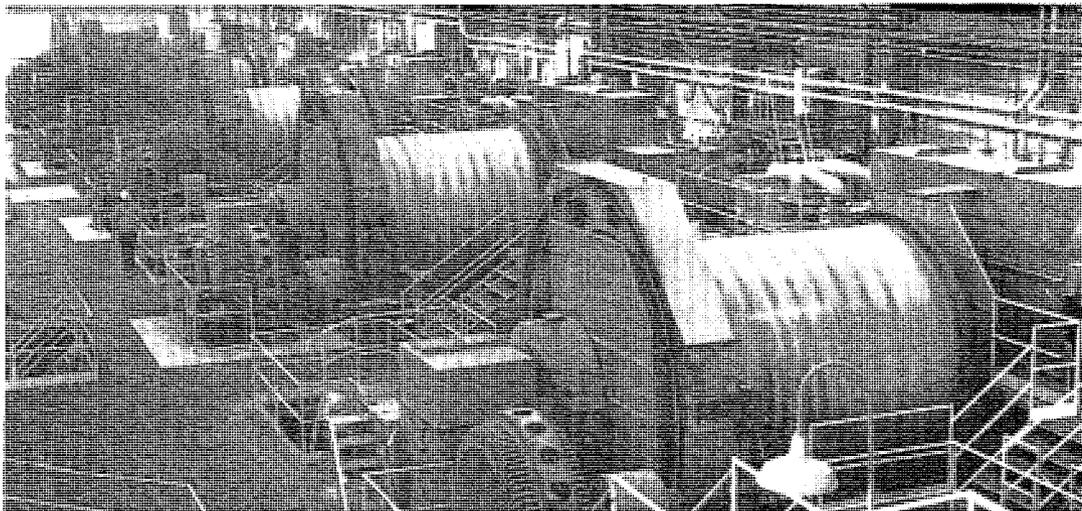
# Milling



Exterior view of the Silver Bell Plant.

The arrangement of the milling facilities provides efficient operation because of the simplicity and compactness of design. Closed circuit crushing is employed to crush 11,400 tons per day of pit ore to ball mill feed size.

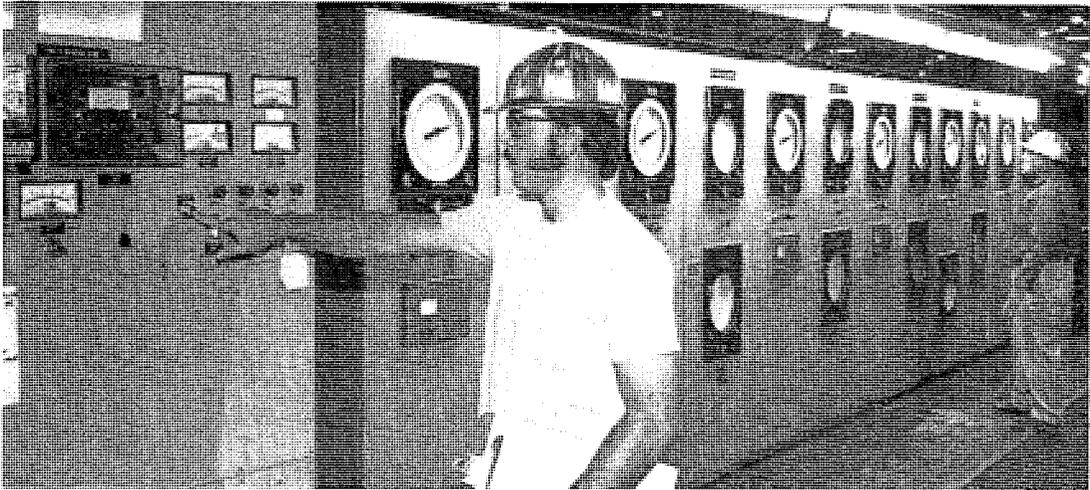
The ore is dumped into the primary crusher, where it is reduced to 6 inches. Secondary and tertiary crushing equipment reduces the ball mill feed.



Ball mills inside the plant are filled with the  $\frac{1}{2}$  inch crushed ore which is further reduced in size.

The crushing plant was designed originally for 1,000 tons per hour in the primary section and 500 tons per hour in the secondary and tertiary sec-

tions in closed-circuit operation. In a 1965-66 expansion program, the secondary and tertiary sections were increased to 600 tons per hour.



Men at the control panel inspect the interlock system.

An electrical interlock system (top) is arranged so that stopping any machine will automatically stop all ore-carrying equipment preceding it.

Failure of a lubrication system automatically causes shutdown of the corresponding crusher.

An inter-communication system with stations at strategic points saves the operators many steps. Closed-circuit TV stations are situated on the primary observation floor and on the Symons crusher operating floor. From here the operator watches ore loading and transfer at several

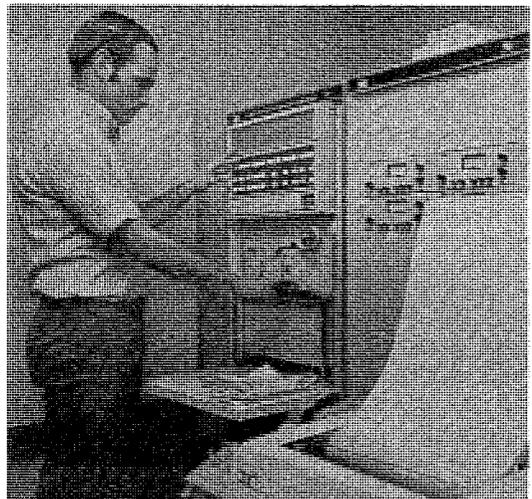
critical points in the conveyor system.

During the crushing operation, special provision has been made to draw off the dust-laden air by both wet and dry dust collectors. Water sprays are installed at several strategic points throughout the crushing plant to keep the dust down to a minimum.

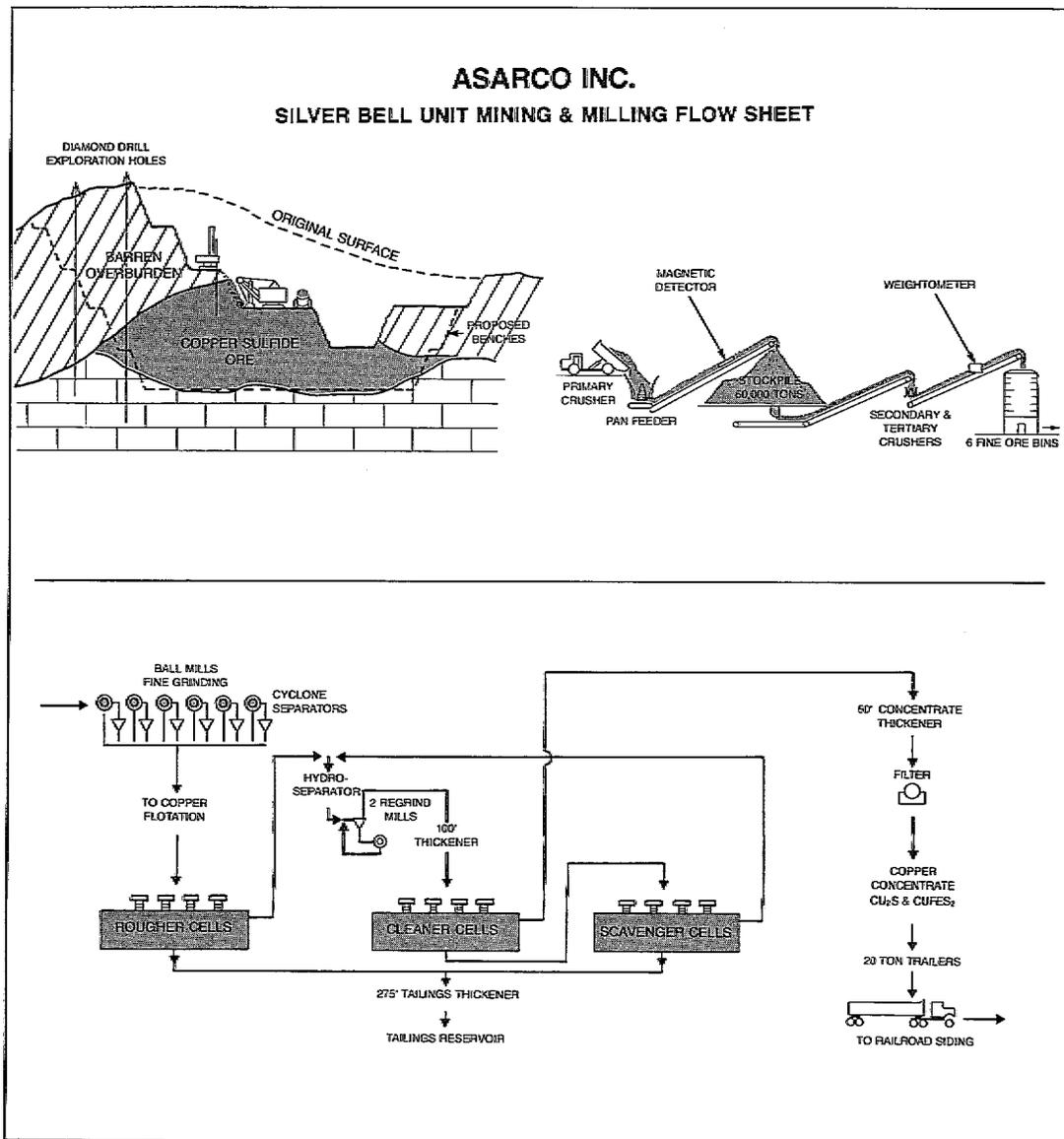
After the ore has been crushed, it is taken to the concentrator building where it is ground and put through flotation cells to separate metal-bearing material from the waste.

Automatic controls (bottom right) are used to keep the size distribution of the flotation feed approximately constant in the face of changing ore hardness. The pulp from the ball mills goes into a 32-cell flotation circuit where reagents are added to the pulp mixture. More than 80 percent of the copper metal values float to the tops of the cells in a froth. The froth is continuously collected and filtered to recover the copper concentrate. Finally, the concentrate is loaded in 20-ton trailer trucks and hauled to Asarco's siding on the Southern Pacific main line near Rillito. The concentrate is transferred into 100-ton bottom-dump rail cars which are then shipped to Asarco smelters in Hayden, Arizona, and El Paso, Texas.

An operator utilizes the Automatic Grinding Control System, employing a computer and varied instrumentation, to give optimum tonnage and to produce a product of desired fineness.



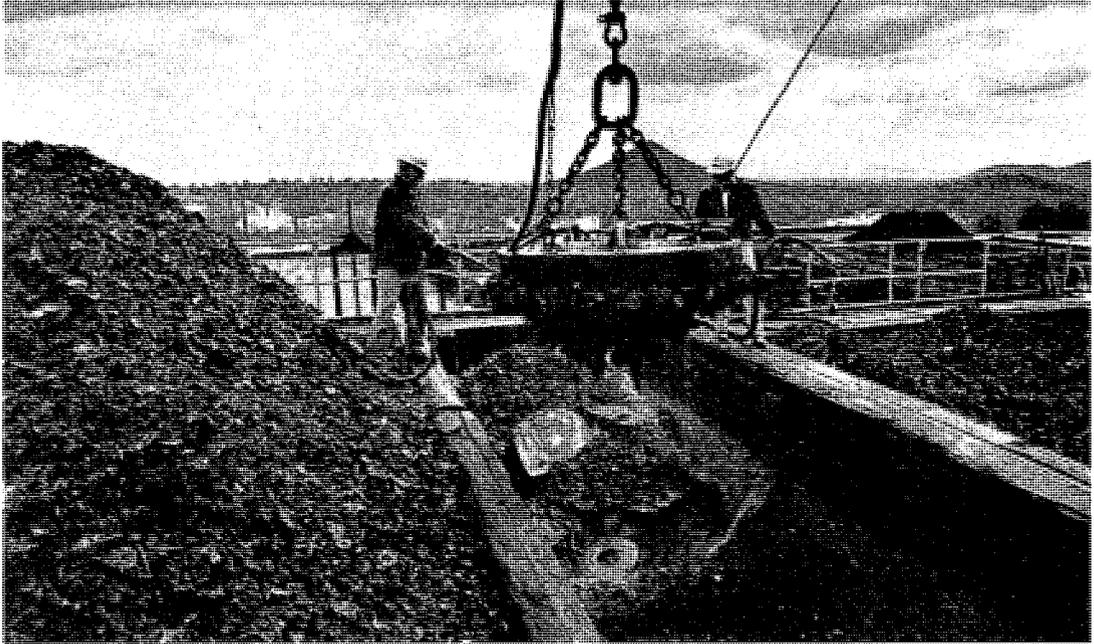
# An easy way to look at it all!



## Leaching or... Another way to remove copper

Some of the copper ore in the Silver Bell area cannot be profitably treated by the flotation method in the concentrator. Therefore, another method of recovering the copper called dump leaching is used. Dump leaching began at Silver Bell in January 1960.

Simply described, the process uses sulfuric acid to dissolve copper in the ore. A network of pipelines carries the acid solution to three separate dumps where the copper ore is stored. After dissolving the copper, the solution, now called the pregnant solution, is accumulated in ponds.



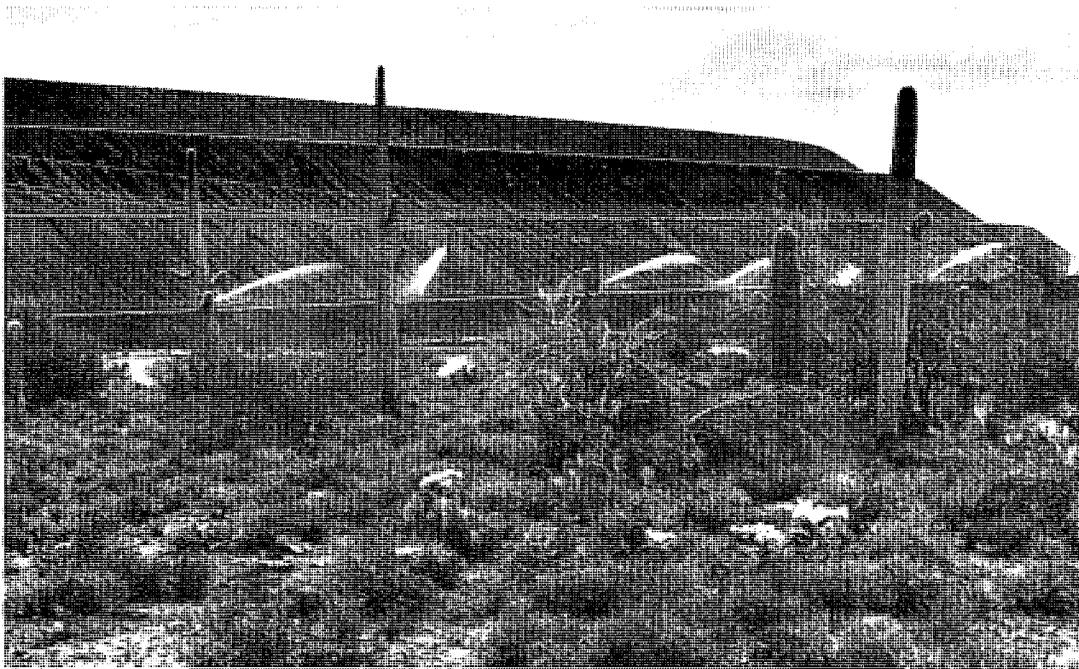
The pregnant solution is then pumped into precipitation cells containing detinned scrap cans (center). The copper in the solution replaces the iron in the cans by galvanic action, creating cement copper.

This copper settles to the bottom of a special holding cell and is washed through a pipe leading to a series of settling tanks. The cement copper is

removed and placed on a concrete pad to dry. At the end of the drying process, the copper is placed in a stockpile.

The copper precipitate is then hauled by trucks to the railroad siding. Usually three trailers, each carrying 35,000 to 40,000 pounds of copper precipitate, fill a rail carload. Cement copper averages 82 percent copper and 15 percent moisture.

## Helping Arizona remain beautiful!



View of the Revegetated Tailings Dams.

Long before protecting the environment, conserving our natural resources, and fighting pollution became common concerns of the public, Asarco had instituted measures to lessen the impact of mining on the surrounding area.

### Dust Control

Dust, even in areas not mined, is a normal Arizona occurrence. At Silver Bell, dust control has always been considered important. Asarco is not only interested in protecting its employees, but in protecting the overall environment as well.

In order to do so, a series of both wet and dry dust collectors are placed in strategic areas, and a water sprinkler system is used in the pits. These precautions greatly reduce the amount of dust in areas surrounding Silver Bell.

### Water Conservation

Just as too much dust is a constant concern, too little water is a worry as well! Believing strongly in the conservation and recycling of the Southwest's limited water resources, Asarco has devised a system for reclaiming approximately 70 percent of the water used in production of copper at Silver Bell.



## Reclamation and Revegetation Plan

"What grows best in the desert ought to grow best at disturbed mining sites and mineral waste deposits in an arid environment," Asarco's Agronomist for The Southwestern Mining Department theorized in 1973, when he was assigned responsibility for developing a total reclamation-revegetation plan for Asarco mining units in Southern Arizona.

To date, the agronomist's theory seems to be proving out, and the desert's eco-cycle is being restored to normal. At one site, as desert grasses and plants became established, rabbits returned to the mine area and, annoyingly, began to eat the fresh growth. Soon however, the coyotes came back as well! Now there is a relative natural balance among vegetation, rabbits and coyotes.

## Summary

Dust control, water conservation, revegetation of disturbed mine sites: these are but a few of the methods used by Asarco personnel to help in the constant battle against pollution and waste. The battle goes on . . . but both Arizona and Asarco are winning!

Agronomist (above) utilizes a hydromulcher to spray seed material down and across the slopes of the tailings dams.

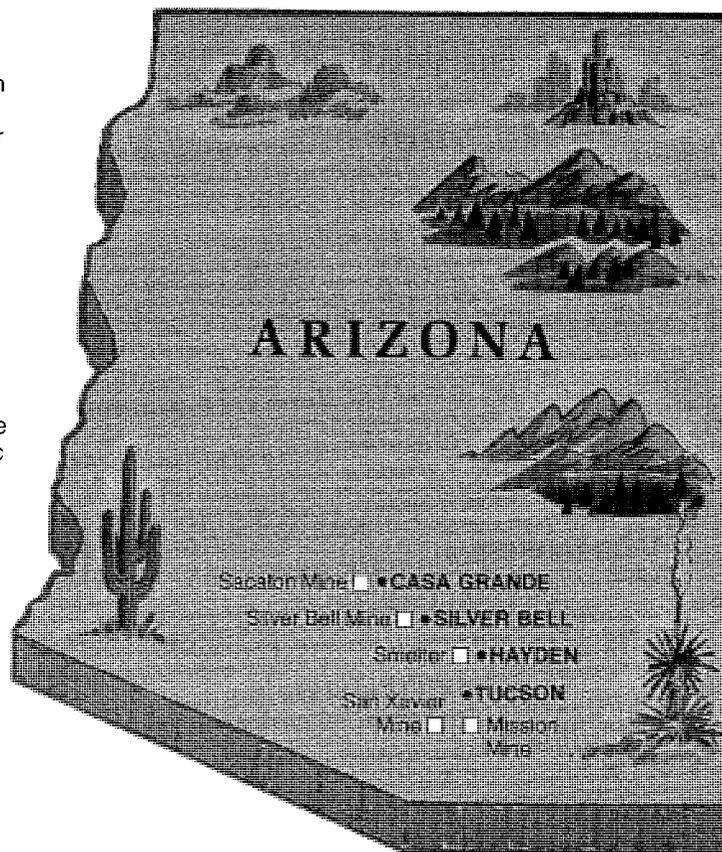
# Asarco in Arizona

Asarco has been part of Arizona's growth and prosperity ever since 1911, when construction began on the Hayden copper smelter at Hayden, Arizona. In 1912, the year Arizona became the forty-eighth state, the first copper from the Hayden smelter was poured. Since then, the plant has been enlarged repeatedly.

Asarco's first important Arizona copper mine was developed at Silver Bell, beginning in 1915, as described earlier.

The Mission mine, named after the famed Mission San Xavier del Bac (bottom left) and situated approximately 15 miles southwest of Tucson, was first optioned in December of 1953. Today, it is Asarco's largest wholly owned mining property.

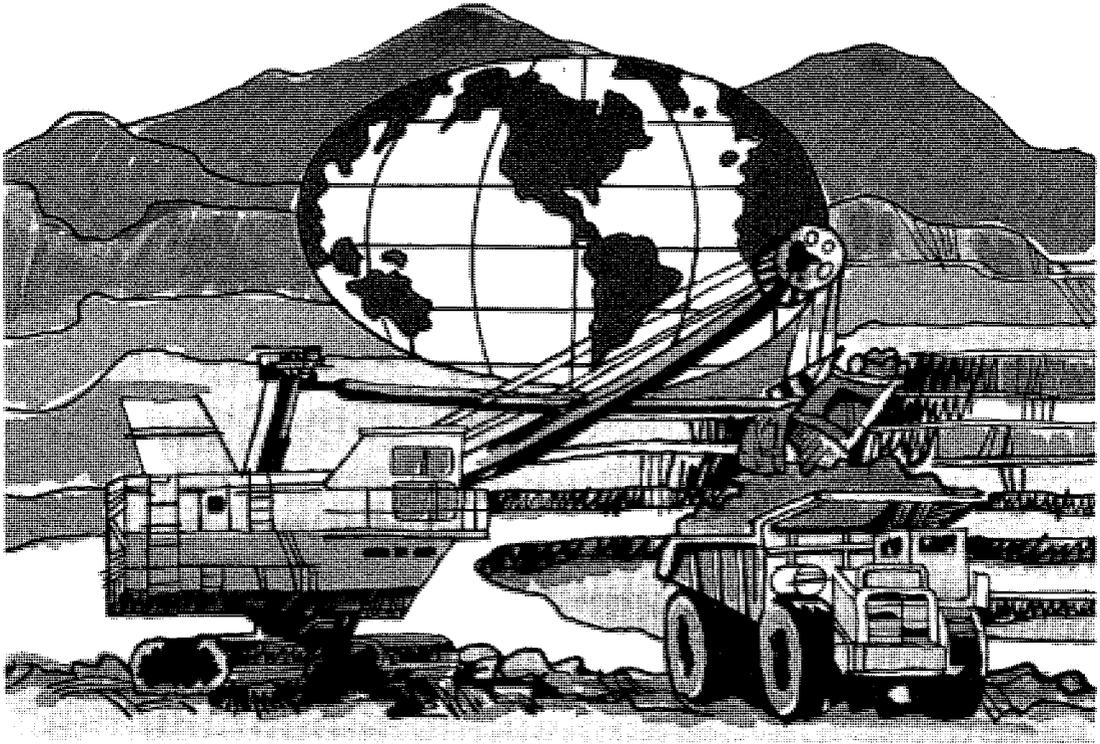
In 1973, production started at Asarco's San Xavier copper mine and leach plant, and in 1974 at the Sacaton mine and mill near Casa Grande.



Asarco's present U.S. copper mines are concentrated in Arizona, "the copper state," which accounts for more than half of the total annual U.S. copper mine output. Today Arizona's mining industry, principally copper, pays a large share of the state's taxes, employs more than five percent of the total workers, and contributes significantly to the state's growth and prosperity.

Arizona has been good for Asarco.  
Asarco has been good for Arizona.

... and the World!



Metal must be mined where it is found. Almost since its inception in 1899, Asarco has been involved in mining ventures, not just in the United States, but outside its boundaries as well. Today, Asarco has a significant interest in three of the world's great mining companies: Industrial Minera Mexico, S.A.; Southern Peru Copper Corporation;

and M.I.M. Holdings Limited in Australia. Additionally, it has interests in other mines in Canada, Nicaragua, Peru and Bolivia.

Briefly, Asarco is a company which extracts vital raw materials from the earth and converts them along with those extracted by others into metals and minerals useful to mankind.

# Profile

**Location:** Silver Bell, Arizona, 40 miles northwest of Tucson

**Mine:** 2 Pits—Known as Oxide and El Tiro—  
Approximately 2½ airline miles apart or 4  
miles by haul road.

**Plant:** Crushing Plant—600 tons per hour  
capacity—Ore crushed from maximum size  
of 48 inches to ½ inch for mill feed. Mill—  
11,400 tons per day capacity or 4,000,000  
tons/year. Copper concentrate shipped to  
Asarco's Hayden and El Paso plants for  
smelting.

**Housing:** 175 two- and three-bedroom houses—24  
two- and three-bedroom apartments. One  
trailer court for private trailers.

**Recreation  
Facilities:** Recreation Hall, Swimming Pool and  
Ball Park.

**Other  
Facilities:** Post Office, Grocery Store and  
Barber Shop.

**Production  
Capacity:** Copper Concentrate 64,000 Tons/Year  
Cement Copper 5,600 Tons/Year

**ASARCO**

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ASARCO Incorporated, Silver Bell Unit, Silver Bell, Arizona 85270

# ASARCO

