

GUSTAV BILLING, THE KELLY MINE, AND THE GREAT SMELTER AT PARK CITY, SOCORRO COUNTY, NEW MEXICO

ROBERT W. EVELETH
New Mexico Bureau of Mines and Mineral Resources
Socorro, New Mexico 87801

INTRODUCTION

That Socorro, New Mexico, was ever a booming industrial center is not readily apparent from our perspective of the 1980's. Yet for a time the town was one of the larger such centers in the Southwest. Many factors had contributed to this state of affairs. For example, the Socorro Peak mining district had developed mines that gave every indication of being successful producers. The Torrence ten-stamp mill and New Orleans and La Joya smelter had been erected on the south end of town to process the rich silver-chloride ores being produced. Moreover, impressive deposits of lead carbonate were being developed at Magdalena and these were shipped to Socorro to be treated at the local smelter or loaded aboard the cars of the Atchison, Topeka, and Santa Fe Railway, which had only recently arrived, for reduction at smelters in Colorado or elsewhere. Socorro, which had primarily been an agricultural community with a relatively steady population prior to the 1880's, began to grow as a result of this increasing industrial activity. The population reached 1272 by 1880 (Eleventh Census, U.S., p. 243). The really large boom came when Gustav Billing purchased and systematically developed the Kelly mine at Magdalena and constructed a large-scale smelting complex at Park City to treat its ores in 1883. Largely because of the honesty, energy, and enterprise of this one man, Socorro would enjoy over a decade of economic growth and would earn the title of Mining and Smelting Center of the Southwest.

DISCOVERY AND EARLY ACTIVITY

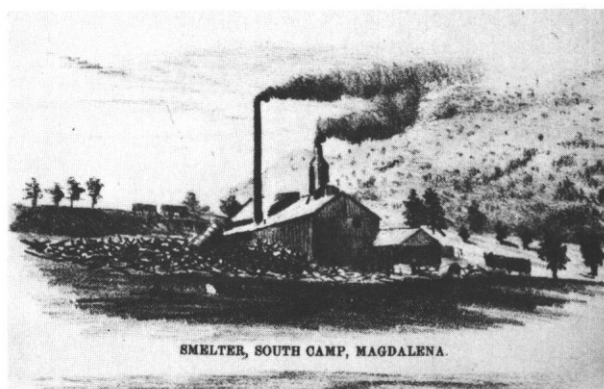
Credit for discovery of the Magdalena mining district goes to Col. J. S. (Old Hutch) Hutchason (Jones, p. 119). Arriving in the Kelly area in the late 1860's (Jones says 1866), Hutch was drawn like a magnet to the only (three) sizeable croppings of Kelly limestone below 8000 ft. These would be the future locations, from north to south, of the Graphic, Kelly, and Juanita mines.

The limestone in Kelly gulch is heavily altered—leached, iron stained, and silicified—telltale signs of potential paydirt to the experienced prospector. Here, nearly all of the original sulfide mineralization, now almost completely oxidized, has been transported down dip by surface waters and redeposited, leaving behind massive iron gossans and box-works of residual silica. In addition to the ochreous tones of the iron minerals, the blues and greens of azurite and malachite are visible along with other carbonates and sulfates, such as cerrusite, smithsonite, anglesite, calcite, and barite.

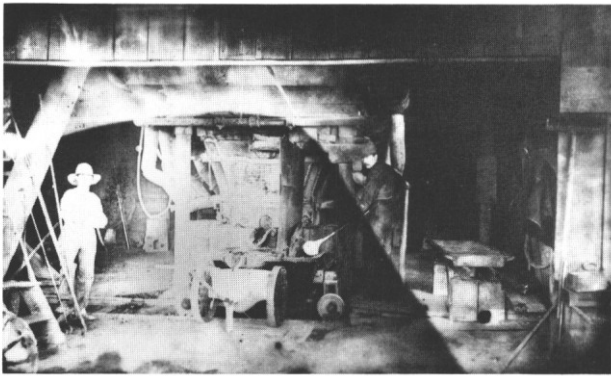
During these early years, assessment work was just about all these early day miners, so destitute of funds, could financially handle. But, despite the meager development, the discoveries attracted attention in the professional journals as early as 1867 (American Journal of Mining, 1/19/1867, p. 262; 4/18/1868, p. 243; 6/20/1868, p. 389) when both the John D. Perry and the Magdalena lodes were briefly mentioned. A correspondent of the Rocky Mountain News visited the camp in 1872 and reported "The district [contains] carbonate of lead, bearing silver to the amount of from thirty to six hundred dollars per ton and (carbonates) of copper rich in silver also."

"Messrs. George, Way & Co. . . . smelted some ore . . . in a small reverberatory furnace of an exceedingly primitive character, and obtained 1839/2 pounds of metal which they had refined at the St. Louis Smelting and Refining Company. After deducting the expenses and loss in cupelling, the shippers received a net profit from the smelting company of \$125.29" (Engineering and Mining Journal, 12/24/1872, p. 411). This appears to have been the first reported shipment from the district. Later a large reverberatory furnace was tried by the Baker brothers but was a complete failure. A small cupelling furnace, however, "worked like a charm. From everything that I have seen . . . I am satisfied that the cupola (sic) furnace is the only one suitable to these carbonate ores, but the miners are poor and unable to erect [furnaces] of any size, with engines and blowers necessary. . . . Why will not some of our capitalists having money to invest send a good practical man here to look into this matter? At the mines the latch string hangs out at the cabins of Messrs. J. S. Hutchason, the pioneer of the district and the proprietor of many leads, Way & Co., Bakers, Hays, Sanborn, Bingham, and many others" (Engineering and Mining Journal, 12/24/1872, p. 411). Just possibly a man 500 miles away in Utah read this article with more than passing interest.

The first big break for the district came when Old Hutch, having invested several years and considerable sums of money, decided to sell some of his discoveries. A one-half interest in the Juanita group was sold to T. B. Catron in December, 1875, the other half going to Col. E. W. Eaton the following May (Socorro County Records, Book F, p. 43, 89). Later Eaton would purchase the Graphic group for \$30,000 (Jones, p. 121) while Patrick Dorsey and associates would eventually acquire the Kelly for \$6,000 (Bullion, 11/1/83, p. 9). Thus the first



Col. E. W. Eaton's smelter, ca. 1880. Originally an adobe smelter built by Shaw and Ales, Col. Eaton purchased and converted it to the 30-ton, water-jacketed plant shown above. This may well have been the local smelter utilized by Gustav Billing during early Kelly mine development. From *Southwestern Bullion Co. Prospectus*; pencil sketch of E. A. Bass photo, L. B. Prince papers, State Records Center and Archives.



Billing smelter, early operational photo, ca. 1884. Man on right is hand-ladling base bullion from cart to bullion molds directly behind him. Assistant stands ready to haul slag cart (foreground) to dump. Note iron sheet which protects tapper from radiant heat. Bullion pigs, about 100 lb each, were shipped by rail to St. Louis for refining. J. E. Smith photo, courtesy Ed. Smith.

men with capital arrived in the district by the mid 1870's. Colonel Eaton successfully operated an adobe smelter at Middle Camp (Kelly) ca. 1867-1880 on the ores from the Juanita group. Thereafter, he purchased Shaw and Ales smelter at South Camp converting it to a water jacketed blast furnace and kept it in blast for several years with ores from the Juanita and Imperial (Brinsmade, 1908, p. 49).

Patrick Dorsey quickly undertook to develop the Kelly into a paying mine, and uncovered an impressive body of lead carbonate. He did little or no stopping, shipping only the ore encountered in development. This ore was probably shipped to one of the local smelters in the Magdalena district or perhaps to the New Orleans and La Joya plant in Socorro (Lake, 4/20/82, p. 5). In either case, it is doubtful much profit was realized. While Eaton's plant operated with some success at this time, he had all the ore he could handle from his own mines. Reduction charges at the Socorro plant were outrageously high, probably because the management had little or no metallurgical expertise. The plant was required to purchase "every pound of flux . . . used." Worse, it proceeded "on the plan that smelting consisted in adding iron and lime to the charge until the slag would run free, regardless of the expense of smelting tons of flux that produced no bullion" (Bullion, 8/1/83, p. 3).

Developments at Magdalena had demonstrated the existence of abundant ore, but it had little real value without a local market. Clearly a large-scale plant, efficiently and scientifically operated, using modern smelting technology was desperately needed if the Magdalena district would see its full potential.

Also needed was a man capable of carrying out the smelting business in a thoroughly scientific manner—a man with sufficient capital to properly finance the business on a commercial scale. That man was Gustav Billing. He had travelled a long circuitous route to arrive at Socorro, but the timing was perfect.

BILLING'S BACKGROUND

Gustav Albert Billing was born in Eschwege, Hesse-Nassau, Germany, on American Independence Day, 1840. He immigrated to America twenty years later, settling first in New York City (National Cyclopedia, p. 253), and held several clerical jobs until 1870 or 1871 when he became associated with his brother William through the banking firm of Hagen and Billing. This event would prove to be Gustav's big break as the firm was managing the portfolio of some New York financiers which included some mining property in Utah. Billing (then about 30 years old) was selected to inspect and report upon the properties (Na

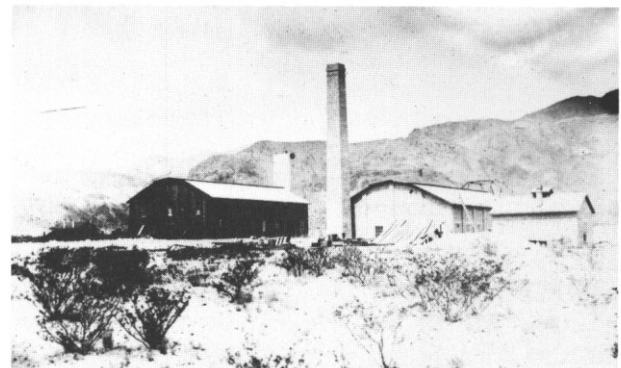
tional Cyclopedia, p. 253). His report resulted in him being sent to Utah permanently where he organized and became manager of the Germania Smelting and Refining Company seven miles south of Salt Lake City at Murray, Utah, the first large scale lead-silver smelter in Utah (National Cyclopedia, p. 253; Raymond, 1873, p. 264).

After five years Billing, along with the brilliant young metallurgist Anton Eilers decided to move on to the new camp of Leadville, Colorado, where they established reputations as master smeltermen. Three years in Leadville would see both men financially established, whereupon Eilers decided to head out on his own. When Eilers left in late 1881 (Burchard, 1883, p. 501) Billing ran the plant on his own for a short time but soon incorporated with August R. Meyer & Co. Sampling Works in April 1883, after the Articles of Co-Partnership with Eilers were dissolved in January, and formed the Arkansas Valley Smelting Company (Burchard, 1883, p. 501; Billing Papers, Taos).

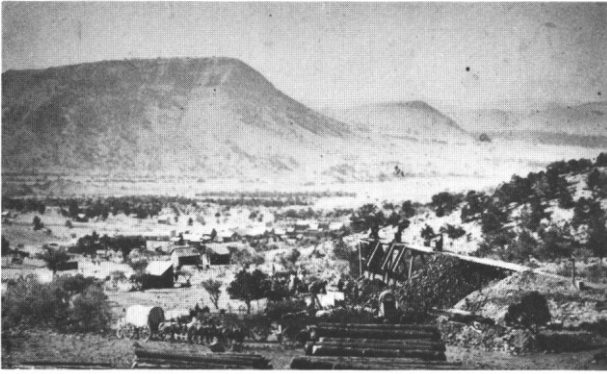
Within a few months after the merger, Billing would sell his entire holdings in the Leadville plant to Meyer. Why would Billing want to dispose of his highly successful plant? No definitive reason is known to the author. Perhaps Billing and his family were tiring of the harsh winters they had experienced in Colorado and Utah and desired to move to a more congenial climate. Or perhaps it was just simply time to move on. Billing seems to have suffered from a near-terminal case of itchy feet. Regardless, Billing was actually considering the move as early as spring 1881. These considerations were doubtless known to Eilers and may have played an important part in his decision to leave later that year (Bullion, 9/11/86, p. 1; Socorro Sun, 4/16/81). When Billing first heard of the Kelly mine is unknown but he probably learned of it initially through the professional mining journals. It is entirely possible that he had reduced some of its early ores at Leadville.

TWO CITIES NAMED PARK

"Mr. Billing came to Socorro during her darkest days, . . . saw the large amount of . . . ore . . . available in the Magdalena Mountains . . . and at once perceived the advantages of the place" (Bullion, 9/1/83, p. 3). Billing had actually sent Albert F. Schneider down from Leadville probably in April, 1881, to examine the Kelly and other properties in the Magdalena district (Bullion, 9/11/86, p. 6; Socorro Sun, 4/16/81). Schneider, Billing's brother-in-law and a highly respected mining and metallurgical engineer in his own right, not only recognized the potential value of the Kelly mine (actually little more than a prospect at this stage) but he also recognized that the ores of the Magdalena district, containing lead, iron, and limestone, were virtually self-fluxing. He saw that Socorro was ideally situated for the



Billing smelter under construction, ca. July, 1883, looking due west. Engine house and 60-ft stack in foreground appear complete but furnace house and main stack still under construction. Note workman on top of main stack and another assembling girders on furnace building, right background. Joseph E. Smith photo, courtesy Ed. Smith.



Mule teams taking on ore at the Kelly tunnel, ca. 1884. Note number and variety of wagons. Ore was first dumped on the ground, because the wagons were unable to take the impact of direct loading. Chutes, constructed soon after this photo, did away with the problem. Heavy timbers in foreground were used for ground support in drifts and stopes. Traylor shaft headframe now stands approximately at this location. E. A. Bass photo, courtesy Socorro Historical Society.

establishment of a smelter: the town was located on the Atchison, Topeka, and Santa Fe Railway and had an adequate supply of high-quality water. Moreover, abundant supplies of coking coal and limestone were available nearby at Carthage and Socorro was more or less geographically centered in an area surrounded by many mining districts which held great promise for mineral production.

Acting upon Schneider's favorable report, Billing decided then and there New Mexico would be the preferred location of his new smelting enterprise should the Kelly mine pan out. Putting things in order after the sale of his Leadville properties to Meyer, he arrived in Socorro during late summer 1882. He quickly sought out Patrick Dorsey and his associates, the Hensons and Kingsburys, and purchased the Kelly for \$40,000 (Socorro County Records, Book 6, p. 274-279; 9/24-26/1882; Bullion, 11/1/83, p. 9). Few local citizens were aware of the fact but this business transaction would prove to be the most significant of the decade. Billing wasted no time in putting a force of men to work in the mine and brought in H. Huber, "one of the most thorough mining engineers in the United States" (Bullion, 9/11/86, p. 1) to supervise development. Billing also negotiated a smelting contract with one of the works then in operation. Which smelter this may have been is unknown at this time but Burchard (1882, p. 376) reported the output of the Kelly (35 tons per day during development) was "bought by the American Mining Company's smelter, directly on the dump of the mine."

Development proceeded smoothly and soon a tremendous body of lead carbonate, averaging 10 ounces silver per ton and over 35 percent lead was blocked out (Burchard, 1882, p. 376; 1883, p. 607). Seeing this, Billing was convinced that construction of a smelter was economically justified (Engineering and Mining Journal, 6/22/89, p. 563). Thus the latter part of 1882 and the early part of 1883 were consumed in the design of buildings, furnaces, selection of machinery, and planning the logistics of the operation. Plant design was entrusted entirely to Albert Schneider who would also supervise construction and later serve as general superintendent (Bullion, 9/1/83, p. 6; 9/11/86, p. 1). Many of the professional people Billing would ultimately bring to Socorro had been associated with him either at Leadville or Utah.

Sometime during early spring, orders were placed for boilers, blowers, crushers, and building materials. The site chosen for the smelter was a point two miles west of the Socorro plaza and which would soon be known as Park City. Here the terrain was relatively flat and open, an excellent source of water was available at a spring one mile west,

and the Socorro-Magdalena wagon road was close by. Additionally, the site was far enough from the main part of town that stack emissions would not be a problem.

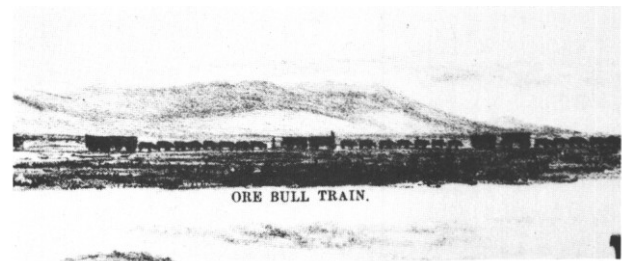
CONSTRUCTION REQUIRES TEAMWORK

During construction, about 75 men were hard at work completing buildings, ore bins, foundations, furnaces, smokestacks, and yard tracks. Completion of the latter was delayed somewhat by construction of a 100-ft bridge across the arroyo southeast of the plant (Engineering and Mining Journal, 7/14/83, p. 24; 7/28/83, p. 55). Meanwhile developments at the mine were proceeding on schedule. Billing planned to have 3000 tons of ore in the supply bins by startup little more than 30 days away. To achieve this he hired every available ox and mule team and wagon he could find. Soon between 150 and 200 such teams, depending on availability were kept busy every day hauling ore from the Kelly (and other mines) and iron ore from as far away as Council Rock. More than 150 teams! Managing this number of animals and wagons must have been one of the largest of operational headaches. The noise and excitement was impressive enough that the editor of the *Bullion* was moved to record arrivals and departures of these teams on a weekly basis until the railroad was completed. Significantly, he did not record train movements thereafter, probably considering them to be ho-hum business by comparison!

The route followed by these teams from Park City to Kelly was west through Blue Canyon to Snake Ranch Flats (the plains between Socorro Peak and the Magdalena Range), thence northwest along the approximate route of the future railroad, around the north end of the Magdalenas, thence southwest and southeast to Kelly, a total distance of about 25 miles.

Now teams can cover between 15 and 20 miles per day, weather permitting, and while the average size of wagon used along this route is unknown, the most popular models in use at the time carried a payload of between 5000 and 7000 pounds (2 1/2-3 1/2 tons). Because of the narrow road through Blue Canyon, some sort of signaling arrangement was worked out whereby a number of wagons passed through eastbound followed by a similar number westbound; passing in the canyon was impossible. This bottleneck obviously increased travel time. Therefore it seems reasonable to assume a layover was necessary about 15 miles from Kelly on the eastbound run and 10 miles from Park City on the westbound run. Camp was probably made between the future Water Canyon station and Snake Ranch. Allowing time for unloading at the smelter and loading at the mine, teams must have required about four days to make the round trip.

Delivering an average of 100 tons a day to the smelter thus required a minimum of 160 wagons and teams (using 2 1/2-ton wagons). Teams



Teams required about four days to make the round trip between Kelly and Park City. Occasionally a steady stream of wagons and mules or oxen, often harnessed in tandem with 14-16 animals, could be observed between Snake Ranch Flats and the north end of the Magdalena Range. From Southwestern Bullion Co. Prospectus, pencil sketch of E. A. Bass photo, L. B. Prince papers, State Records Center and Archives.

were made up of 6-8 mules or oxen (Clark, 1942, p. 8); occasionally wagons were hitched in tandem in which 12-16 animals were used. From the perspective of the 1980's the sight is difficult to imagine; bullwhackers and muleskinners, at best a rough-cut lot, constantly cussing and shouting, whips cracking, chains rattling, axles squeaking, and heavy steel-tired wheels clattering over rocky ground. Socorro had never seen anything like it; there were few places where, during daylight hours, an observer could not see a continuous stream of wagons and teams from Snake Ranch flats all the way to the north end of the Magdalena Mountains. And this situation continued, day after day, from mid 1883 until the Magdalena branch was put into service in January, 1885.

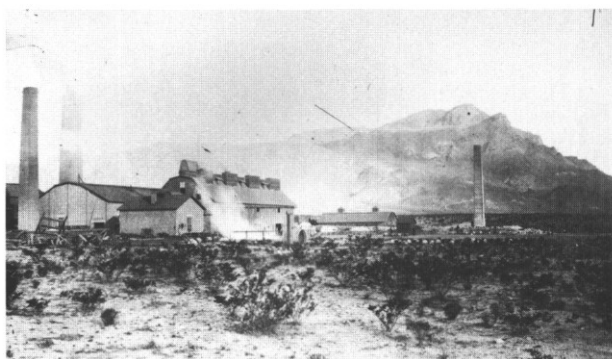
By early September, all was ready at the smelter and with much credit due to Albert Schneider the plant blew in without mishap. The 2½-mile spur track had been completed just in time to receive bullion from the no. 1 furnace which had gone in production September 8. Gustav Billing was the sole owner and had invested about \$300,000 in the plant and facilities (Bullion, 1/1/84, p. 8; Engineering and Mining Journal, 9/22/88, p. 188).

Billing's smelter, the very first large scale industrial enterprise (excepting the railroad, perhaps) in New Mexico was an incredible success. The second furnace was blown in one week after the first. Construction was immediately initiated on the third which went in production by early December. By January 1, 1884, 2303 tons of base bullion had been produced providing the Atchison, Topeka, and Santa Fe Railway with 185 carloadings (about 12½ tons each) of precious cargo (Bullion, 1/1/84, p. 8).

Based on available data, the Billing works produced over 300 bars of bullion a day (or about 9 carloads a week), at least through 1889, which were shipped to St. Louis for refining. Thanks to Gustav Billing and the expertise of his professional staff, smelting costs in New Mexico were, by 1885, the lowest of any in the Southwest (Williams, 1885, p. 425).

TWO IF BY LAND-ONE IF BY RAIL

Successful as it was, Billing well knew the ultimate potential of the enterprise could not be realized without a more efficient means of transportation. Mule and ox teams would have to do for the interim but clearly they had severe limitations. There were times when, regardless of the numbers employed, teams could not keep up with the smelter's demands. A railroad from Park City to Kelly was, as far as Billing was concerned, a necessity. Now, building a 21½-mile industrial spur from the main line to the plant was easy, but a 30-mile branch to the mines was quite another story, particularly since the Santa Fe people



Billing smelter in blast ca. mid-1884, looking nearly due west. Low building in rear center is first roaster. Note dumps of mines at base of Socorro Peak behind roaster stack. Joseph E. Smith photo, courtesy Ed. Smith.



Quarrying limestone along San Pedro (Carthage) branch, AT&SF Railway, ca. 1884. Both steam "donkey" engine and mules were used to snake limestone boulders onto flatcars which were then hauled to Socorro for flux at the smelter. Joseph E. Smith photo, courtesy Ed. Smith.

were reluctant to construct the line in the first place. But Billing ultimately convinced the railroad company and granted them several concessions. These included Billing's personal guarantee that the Kelly would provide ore shipments sufficient in tonnage and duration to justify the investment. Doubtless other concessions included contracts for delivery of Carthage coal, coke, and limestone. Projected freight revenues of these commodities and ore shipments from the Kelly and other mines placed the venture in an entirely different economic light and the railroad company went for it. In years to come the railroad would have cause to rejoice over that decision. "Owing to shipments of ore over the Magdalena branch, it is the best paying thirty miles of road owned by the Atchison, Topeka, and Santa Fe Railroad Company" (Mining and Scientific Press, 7/9/1887, p. 25). That may have been a slight exaggeration but certainly the line was a good investment.

All this didn't occur overnight, however; evidence suggests that Billing worked with the railroad company for nearly six months before they finally agreed and by then the success of the Kelly and construction of the smelter were assured. Clearly the railroad company was proceeding cautiously—perhaps too cautiously—given Billing's impressive track record and successful ventures in both Utah and Leadville. Nevertheless, the final decision for construction would not be made until June, 1883. Soon after, 100 workmen began on the grade. The graders reached the smelter site by the end of July and the survey crew, then twelve miles from Socorro, were expected to reach Magdalena within two weeks (Engineering and Mining Journal, 6/30/1883, p. 385; 7/28/83, p. 55). Additional hands were put to work when grading was completed on the Lake Valley branch in southwestern New Mexico (Bullion, 3/1/84, p. 4). Work continued thus on through the following summer and the road was scheduled for completion in September when bad weather intervened. Water, which was scarce along the branch, was too abundant along the main line. Heavy flooding during June washed out tracks in several places and delayed delivery of rails, ties, and other supplies (Burchard, 1884, p. 393). Rains in fact were so heavy, grading and tracklaying operations were curtailed throughout August; not until September could work resume (Bullion, 9/1/84, p. 9).

Billing and Schneider made very few errors in planning, but the severe rains caused one unforeseen problem for the smelter which had by now been in successful operation for a full year; they had planned to ship ore over the new road by late summer and in anticipation of this had let many of the teams go. Consequently, ore supplies ran low while the management scrambled around for teams and wagons wherever they could be found. The third furnace had to be blown out until

the situation improved (*Engineering and Mining Journal*, 8/30/84, p. 148; 2/14/85, p. 112; *Bullion*, 2/1/84, p. 10).

By January 1, 1885, the branch was completed to Magdalena and crews continued laying track on toward Kelly, completing this portion by the end of the month.

The favorable economic impact of the new railroad was immediate—for the first time since start up of the smelter sufficient ore was available and the third furnace was again blown in. Except for maintenance shutdowns the smelter would generally run to capacity even when enlarged to 250 tons per day later in 1889. Only an occasional strike at the coal mines or washouts along the railroad would slow operations. Delivery time dropped from 2 days via team and wagon to one by rail, and freight rates which had been \$4.50 to \$5.00 per ton were cut to \$2.50 (*Bullion*, 5/26/85, p. 5). Thus lower grade ores could be mined and shipped profitably.

As the smelter prospered, so did many associated industries. The Atchison, Topeka, and Santa Fe Company built the San Pedro branch east from San Antonio in the spring of 1882 to tap the coking-coal deposits in the Carthage field. Subsequently, the San Pedro Coal and Coke Company (an AT&SF subsidiary) erected coke ovens at San Antonio and with the increasing demand from the smelter, success was assured and the industry grew rapidly. In 1882, for example, 60 men were employed producing 15 carloads a day at the mines. But within two years the work force was increased to 200, and two shifts were eventually required to keep up with demand (*Engineering and Mining Journal*, 1/1/87, p. 12).

Obviously Gustav Billing was extremely valuable to the Atchison, Topeka, and Santa Fe Company. Revenues derived from Kelly ore and smelter bullion shipments alone were well over \$100,000 per year, and this does not include other revenues for shipments of coke and limestone from Carthage, iron ore from Silver City, and imported fluxing ores from El Paso, as well as domestic ores from other points in New Mexico and surrounding states and territories. As early as October 1885, for example, Billing was purchasing 18 cars of Utah ore per week (*Las Vegas Mining World*, 10/1885, p. 4).

ELEVEN YEARS OF BULLION

That the Billing Smelting enterprise was successful is well established. But further evidence is provided by the fact the plant never, during its 11-year life, ceased operations due to circumstances within managerial controls. Problems such as rail service interruption and coal strikes were overcome by carefully planning and stockpiling of vital supplies. Only once, during 1884, did the plant shut down—and this for just one week when the fuel supply became completely exhausted (*Bullion*, 9/11/86, p. 1).

Falling metal markets and decreasing ore grades were handled by increasing both efficiency and capacity of the plant. The Billing (also known as Rio Grande) smelter in fact underwent constant change and expansion from the day it first blew in. Some of the improvements were provided solely for the safety and convenience of the employees. These would include a suite of bathrooms installed in 1886 and an electric light plant in 1890, the latter certainly one of the first in the Territory and without doubt a striking sight at night (*Bullion*, 3/20/86, p. 2; 12/23/90, p. 3).

Billing enjoyed a near monopoly reducing southwestern ores until August 29, 1887, when the El Paso smelter (now operated by American Smelting and Refining Company) went into production. During this time, however, Gustav Billing never took advantage of his unique position and kept his smelting fees so low that virtually every mine producing in New Mexico and Arizona shipped their product to Socorro.

Even after the El Paso plant blew in, there was still more than enough business for both smelters. Imports of Mexican fluxing ores and domestic production had increased to the point where both plants had to

refuse ore as late as 1892 (Hadley, 1892, p. 58). With a daily capacity of 250 tons, the Rio Grande smelter operated successfully at least through 1893. Why, then, did it fail?

END OF AN ERA

There were two prime reasons for failure of the Billing smelter: (1) a crippling duty increase imposed on Mexican fluxing ore, and (2) a steady decrease in demand, and therefore price, of silver.

Since the early 1870's, a tariff law had imposed a duty on all lead ores imported into the United States. This law was amended by the Windom Rule of 1883. Under this rule, an ore which contained gold and/or silver whose value exceeded that of the contained lead, was classified as a gold or silver ore and therefore entered the country duty free. Thus, during and after about 1884, southwestern smelters, particularly the Socorro plant and later the El Paso plant, imported increasing amounts of Mexican fluxing ores. The free use of these allowed the southwestern smelting industry to prosper and grow to the point where over 70,000 tons of Mexican ore was imported during 1888 (*Engineering and Mining Journal*, 9/17/92, p. 267).

The free importation of the Mexican ores not only benefited the southwestern smelters but countless southwestern mines as well. Smelting fees were so low it was possible to mine and ship relatively low-grade "dry" ores that would have otherwise been unprofitable to work. "Dry" ores were those having insufficient lead to precipitate gold and silver in the lead smelting process. "Wet," or high-lead, ores were added to the charge to bring the overall lead content up to optimum 8-14 percent. This was indeed the golden age of mining in the southwest, particularly in Arizona, New Mexico and southern Colorado; thousands of mines were worked to profit (and a similar number of miners kept gainfully employed) in this environment—an environment which may never again exist. (Consider these facts the next time you visit an abandoned mining district and wonder what all those crazy miners thought they were doing digging worthless holes in the ground.)

Colorado smelters, at least for a time, could no longer compete in the southwestern ore markets. Naturally, they resented the loss of business and viewing the Windom Rule as the prime culprit, began to lobby in Washington for its repeal. Their lobbying was ultimately successful and the old law was replaced with the McKinley Tariff, October 1, 1890 (*Engineering and Mining Journal*, 9/17/92, p. 262). Billing never lived to see it—he had died February 14, 1890, not quite 50 years of age. This act levied a duty of 11/2 cents per pound on all imported ores containing lead regardless of their precious metal content, thereby increasing the cost of Mexican fluxing ores by an effective \$30 per ton and eliminating much if not all the profit realized by the southwestern smelters (Fell, 1979, p. 196). "The result of this brilliant piece of statesmanship and patriotism was to build up the metallurgical works in Mexico, largely with American capital, to increase the smelting charges of our own 'dry' silver ores by an average of about \$2 a ton, thereby increasing the cost of silver, and by adding the Mexican output of both silver and lead (to our own) it added to the demoralization of the silver and lead markets" (*Engineering and Mining Journal*, 9/17/92, p. 268).

The other main force working against the lead-silver smelting industry had been gathering momentum for over a decade, but became critical during the late 1880's—that of decreasing demand for silver itself. Back in the 1870's many nations coined silver freely and absorbed whatever the producers had to offer, regardless of quantity. But as the wealth of the world increased, so did the preference for gold as a monetary standard. Demand for silver decreased as one country after another demonetized the metal. Gradually more silver was available than could be consumed in coinage and the bullion value dropped below

Table 1. Prices for lead, silver, and gold during the interval 1880 to 1900. From *Mineral Resources of the United States, 1931, part 1, metals, p. A115*.

Year	Lead (\$ per pound)	Silver (\$ per fine ounce)	Gold (\$ per fine ounce)
1880	0.050	1.15	20.67
1881	0.048	1.13	"
1882	0.049	1.14	"
1883	0.043	1.11	"
1884	0.037	1.11	"
1885	0.040	1.07	"
1886	0.046	.99	"
1887	0.045	.98	"
1888	0.044	.94	"
1889	0.039	.94	"
1890	0.045	1.05	"
1891	0.043	.99	"
1892	0.041	.87	"
1893	0.037	.78	"
1894	0.033	.63	"
1895	0.032	.65	"
1896	0.030	.68	"
1897	0.036	.60	"
1898	0.038	.59	"
1899	0.045	.60	"
1900	0.044	.62	"

the coining value. The economic strain on the remaining bi-metallic governments became increasingly unbearable since silver was, at least theoretically, convertible into the more desirable gold at a pegged rate of exchange. For a time, various governments attempted to uphold the value of silver by making large, regular purchases of the metal. Under the Sherman Act of July, 1890, for example, the United States purchased 4/2 million fine ounces of silver per month and did manage to boost silver prices at least temporarily (Table 1). Despite such efforts, however, supply increasingly outstripped demand and silver prices began falling precipitously in 1891, culminating in two events which would provide the coup-de-grace for the lead-silver smelters.

On June 26, 1893, the India Council of the British government closed the Indian mint to the free coinage of silver (*Engineering and Mining Journal*, 7/1/93, p. 3). Market effects were immediate: the mint had consumed 45 million fine ounces of silver annually as recently as 1892 (*Engineering and Mining Journal*, 7/1/83, p. 2) and the sudden closure caused the silver market to crash. Prices dropped to below \$0.65 per ounce and most silver-lead mines and smelters in the United States closed overnight. The Rio Grande Smelter, due in considerable degree to recent improvements and enlargements, but primarily because the Kelly mine and others in the Magdalena district still provided a substantial portion of its fluxing ore, held on throughout 1893.

With the closing of the Indian mint, political pressure on the United States government resulted in the repeal of the Sherman Silver Purchase Act on November 1, 1893 (*Engineering and Mining Journal*, 11/4/93, p. 463) and silver prices dropped further. Management at the plant held on throughout the first half of 1894, long after many other plants had closed, assuming the situation *had* to improve. Markets, however, went from bad to worse; the smelter was finally forced to close in early July (*Chieftain*, 7/13/94, p. 1). But the plant was not for sale and ore purchasing advertisements continued to appear in newspapers as late as October, management apparently planning to reopen when and if the market recovered (*Chieftain*, 10/5/94; *Silver City Enterprise*, 6/15/94). The shutdown, however, was permanent.

The effect upon Park City and Socorro was immediate and disastrous: the cornerstone of Socorro's economy—the plant which had produced somewhere between 15 and 20 million dollars in base bullion during the previous eleven-year period—was gone. The closing of the plant wiped out Park City (population dropped from 400 to 10 almost overnight) and "crippled the business of Socorro" (*Sanborn map*, 1/1893; 4/1898; *Chieftain*, 7/13/94, p. 1). Socorro's population, which had reached 2300 in 1890, dropped to 1500 by the turn of the century

(Thirteenth Census, U.S., p. 576). This would be the beginning of hard times—a depression actually—that would last well over a decade.

For five years the plant stood cold and idle, a ghostly reminder of the prosperity that used to be. Then it was sold in 1899 to the newly organized American Smelting, Refining, and Mining Company (ASARCO) (Loughlin and Koschmann, 1942, p. 78). This company, closing many plants throughout the country in an effort to both consolidate and control the industry, decided not to reopen the Rio Grande smelter, choosing instead to expand and improve the El Paso plant which is still in operation today. Some of the machinery (presumably the newer equipment installed during the final 3-4 years of operation) was dismantled and moved to El Paso during 1899 (*Chieftain*, 3/31/1899). Much remained in place, however, at least until 1912 when C. T. Brown, George Cook and associates purchased what was left (Socorro Tax Assessment Roll, 1912, p. 14; Socorro Deed Record Book 90, p. 185-187, 12/3/1912). These men renovated the Graphic smelter on Cuba road at this time (A. B. Baca, 1982, oral commun.) and it is possible some of the machinery from the old Billing plant was used for the purpose.

The last of the buildings, the two-story office complex, was torn down in ca. 1962 (Robert Weber, 1982, oral commun.). Stacks of ledger books, receipts, bills-of-lading, assay reports, and other irreplaceable operational documents of the plant were dumped on the ground and burned (Robert Weber, 1982, oral commun.). Today all that is left to remind us of this once great enterprise is the slag pile at Park City, mine dumps at Kelly, an abandoned railroad grade between Socorro, Magdalena, and Kelly, and a few scattered accounts in now obscure newspaper and government reports.

PRODUCTION

As a result of the near-sighted destruction of records, production figures are difficult to come by. Exact data have been gleaned from period newspapers and government documents for the period 1883 through 1889. Production for the period 1890 through June, 1894, is not currently available and is estimated on the following basis: Value of production grew 81% from the beginning of 1884 through the end of 1889, an average yearly increase of 13.5 percent. Markets increased during 1890 and 1891 and decreased thereafter. The author has therefore applied the 13.5 percent increase to 1890 but assumed production remained flat throughout 1891. Markets decreased about 10 percent per year thereafter; 1894's production is 10 percent less than one-half of 1893 (Table 2). These are only estimates; future research will doubtless reveal the actual figures.

FINAL BILLING

After the smelter closed, Mrs. Henriette Billing continued to operate the Kelly mine under lease, making several trips per year from her Cincinnati home to look after the property. By 1904, however, she tired of this arrangement and sold the Kelly properties to the Tri-Bullion Smelting and Development Company of Chicago for \$220,000 (*Billing Papers*, Taos). The mine under new ownership and management went on to make a new name for itself—this time as a producer of zinc. But the glory era—one of exciting new mine discoveries, of ox and mule teams hauling long trains of freight wagons across the plains, of building branch-line railroads, of proudly pointing to a mine dump as a thing of prosperity, and of hundreds of small mines shipping sacked ore to local smelters—that era has gone forever, and with it, down that ever lengthening dusty trail of memories, went the Old West.

Table 2. Annual production of the Billing/Rio Grande smelter, 1883 through 1894. Sources: U.S. Treasury Department, Annual Reports, Director of the Mint; Las Vegas Mining World, newspaper; The Bullion newspaper; San Marcial Reporter, newspaper; Mining and Scientific Press; Engineering and Mining Journal.

Year	Base Bullion, Short tons	Ore Treated, Short tons	Lead, lbs	Silver ounces troy	Gold ounces troy	Value, \$
1883	2,303		4,599,956	86,049	4.5	267,245.26
1884	5,663		11,291,732	577,281	2,068.5	1,078,266.59
1885	4,683	20,400	9,302,813	909,652.6	3,926.3	1,417,501.76
1886	5,237		10,399,807	1,077,403	2,841	1,638,480.26
1887	5,208		10,340,085	1,112,435.5	3,924.5	1,662,479.28
1888						1,909,000.00
1889	5,795	31,000	11,500,000	1,292,600	14,040	1,953,750.80
1890						2,200,000.00 ¹
1891						2,200,000.00 ¹
1892						2,000,000.00 ¹
1893						1,800,000.00 ¹
1894						800,000.00 ¹
Total Value \$						18,000,000 ¹

¹estimated; see text under "production."

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