

Pitting the Comstock:

W. J. Loring and the

Arizona Comstock

Company

By
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Mass mining came slowly to the Comstock. Forty years after the Big Bonanza, Nevada miners still debated whether the low-grade gold and silver ore left behind could be profitably worked. In the 1920s two big mining companies tried their luck, with cyanidation replacing the old pan-amalgamation process. They spent millions of dollars and mined millions of tons of ore, but both shut down after failing to make a profit.

This article focuses on a third company, the Arizona Comstock. It arrived in the 1930s, when costs were falling and precious metal prices were rising. It had the same goals but used a milling technology new to the Comstock: flotation. It also began underground but switched largely to mining and milling surface ores. The result was the same: it failed to profit, but it left behind a surface excavation, the Loring Cut, or Loring Pit as it was later called, named after William J. Loring, mine manager and later president of Arizona Comstock. This article explores the company's operations under Loring's leadership, and assesses the causes of its failure in the larger context of the Comstock's low-grade mining operations.

Mass Mining in the 1920s

After years of decline following the Big Bonanza, the Comstock district began to revive with the resumption of precious metals mining at the end of World War I. Although the rich deposits above the Sutro Tunnel were long gone (except for an occasional small pocket and a few stringers), millions of tons of lower-grade ore still lay in the old stopes and headings. Most of it was refractory, an altered assemblage of rock and minerals containing gold and silver in association with pyritic sul-



*The Loring Cut in 1935, a year after it was opened.
(Jay Carpenter photo, UNR Special Collections, UNRS-P1988-55-0292.)*

fides. To mine and mill it economically required good management, consolidation of mining properties, economies of scale, and cutting-edge technologies—in short, all of the attributes of mass mining.

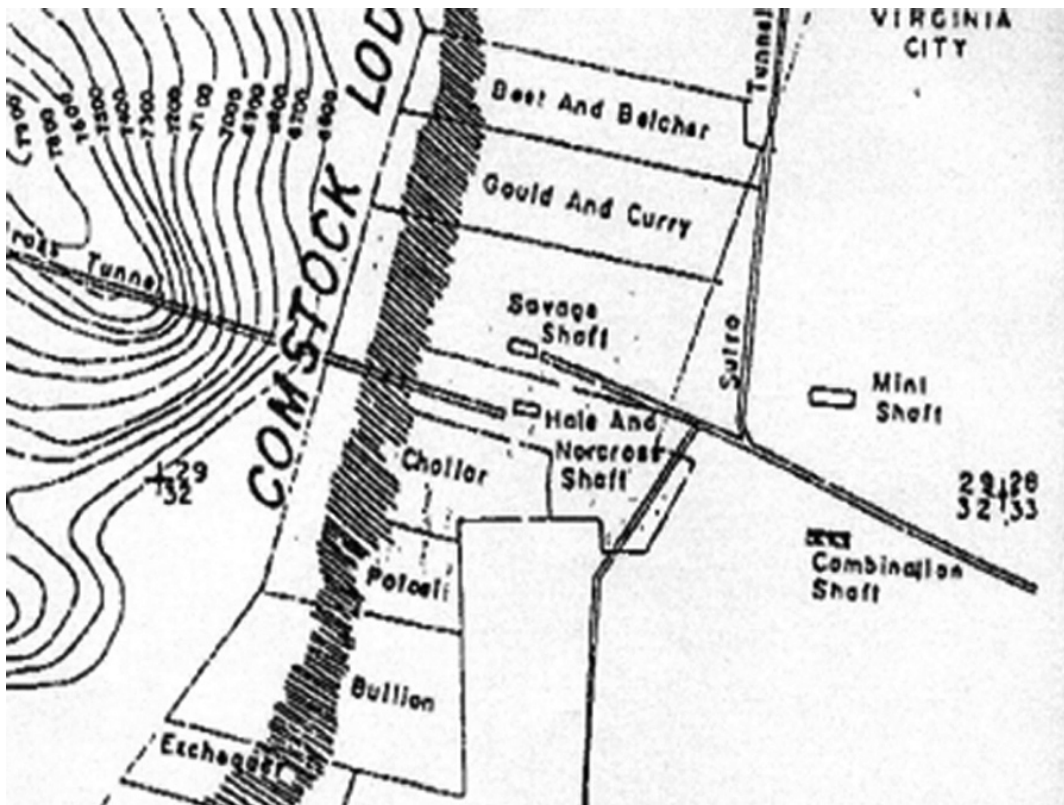
Technological change came first. In the first two decades of the twentieth century two milling technologies, flotation and cyanidation, revolutionized the process of ore dressing and reduction. Flotation made possible the economical concentration of porphyry coppers and other low-grade base-metal deposits, but its application to gold and silver ores was still in the experimental stages. By World War I cyanidation, in contrast, had largely replaced the old Washoe Process for treating Comstock ores. “The metallurgy of the Comstock ore shows it to be an ideal cyaniding and mechanical ore to handle,” said one observer after tests recovered over 90 percent of values in a pilot plant—a huge improvement over pan-amalgamation.¹ By 1915 small commercial cyanide plants were springing up all along the Lode—and indeed all across the West—to capture the remaining values in mill tailings and waste piles that earlier miners had left behind.

The consolidation of major Comstock mines advanced significantly in 1919, when a Denver mining syndicate purchased eleven separate properties along the southern section of the Lode and organized the United Comstock Mines Company to exploit them. It invested heavily in development and equipment, figuring to turn a profit on two million tons of six-dollar ore blocked out above the 490 level.² To maximize ore delivery and processing, the company drove a two-mile haulage tunnel and constructed a 2,500-ton cyanide plant, touted at the time as the “largest single unit gold and silver mill in the world.”³ Based on test results with finely ground ore in a Merrill-Crowe circuit, company engineers confidently predicted aggregate recoveries of 92 to 96 percent.⁴ In three years of actual operations, however, mill-head values never rose above \$4.30 a ton, and only 90 percent of those were recovered.⁵

With United Comstock still in development, a new operating company backed by British capital entered the district. In 1922 Comstock Merger Mines, a division of Consolidated Goldfields of South Africa, bought up a two-mile section of the Lode between the Imperial and the Consolidated Virginia collectively known as the Middle Mines, some fifteen properties in all, including the Savage, Hale and Norcross, Chollar, and Potosi.⁶ Extensive new development work and sampling of exposed older workings promised Comstock Merger a larger volume of ore at higher grade than its southern neighbor, but United Comstock had two attractive assets: a huge cyanide plant, and a two-mile haulage tunnel only a half mile away from the main adit of the Hale and Norcross. Thus, in 1924, Comstock Merger took controlling interest in United Comstock, thus bringing together four and a half miles of the Lode under one operation.⁷

Profitability remained elusive despite consolidation. The big mill ran full-time for two more years, bringing the combined total production of the two operations to nearly two million tons of low-grade ore, but revenues never exceeded costs.⁸ In 1926 Comstock Merger closed, citing declining silver prices, but at least one critic thought that was only “a very handy and plausible excuse . . . in explaining failure to stockholders.”⁹ Ira B. Joralemon, a consulting geologist, later cited caving, dilution by barren wall rock, and rising costs as contributing factors.

The sudden closure of Comstock Merger Mines cast a shadow over the local economy, but it also provided an opportunity for further consolidation by two well-known Comstock businessmen, James and Franklin Leonard, who represented the Comstock Tunnel and Drainage Company, a successor to the original Sutro Tunnel Company.¹⁰ In 1928, by adding the Comstock Merger properties to other holdings, they brought together under one management all of the major lode mines from the Ophir, northwest of Virginia City, to the Overman in Silver City.¹¹



Arizona Comstock worked four properties in the “Middle Mines” of the Lode. (Map excerpt from Willard D. Thompson, “Exploration Proposal for the Chollar-Potosi, Hale and Norcross, and Savage Mines, Comstock Lode. . .,” Typescript, 1979. UNR Special Collections, 12001196-11.)



*Local papers celebrated the grand opening of Arizona Comstock's flotation mill.
(Nevada State Journal, 16 January 1933.)*

Although backed, it was said, by “a strong combination of Eastern capitalists” anticipating quick returns on their investment, the Leonards moved cautiously, gradually reopening old workings and mining just enough to pay development costs while they determined how best to proceed. They were still in the planning stages when the onset of the Depression drove down silver prices and slowed further development.

Although the Comstock was most notably a silver district, gold made up nearly half of its historic output. One vein discovered in 1932 by a crosscut in the margins between the Hale and Norcross and the Savage properties assayed 70 percent gold and 30 percent silver.¹² Silver prices fell over 40 percent during the first years of the Depression, but the gold market held steady until Britain went off the gold standard in 1931 to stimulate inflation, followed by the United States two years later. Global gold prices dipped briefly, but then climbed 50 percent between 1931 and 1934.¹³ Gold’s allure and depreciated currency spurred rising production of all precious metals. Miners would agree that “bad times are good times for gold,” as one geologist has written.¹⁴

Howard Squires and the Arizona Comstock Corporation

Gold’s resurgence brought a new operator to the Comstock. In 1931 the Leonard Brothers optioned the Savage, Hale and Norcross, Chollar, and Potosi mines to Howard W. Squires, acting on behalf of the Arizona Comstock Corporation. Incorporated under Nevada law and capitalized with two million shares at one dollar par, the firm was organized by a southern California syndicate with its origins in Arizona copper. Four of its five directors were investors with little or no mining experience, including Howard Jones, head coach of the USC Trojans. The fifth was Squires, a mining engineer who had periodically served as consulting engineer for the Leonard Brothers since 1929 and had thoroughly explored the ground.¹⁵

A Chicago native and graduate of U.C. Berkeley’s engineering program, Squires had been active in mine management since 1900 throughout the West and in Canada. With the new company’s board of directors split between investors from Los Angeles and Davenport, Iowa, Squires, as general manager, exerted a strong influence over both company policy and field operations. On his recommendation, the company announced plans to reopen old workings underground and mine the low-grade ore left behind in stopes and reserve piles. It would also explore virgin ground in the margins.



Howard Squires, the first managing director of Arizona Comstock, believed Comstock ores could be profitably reduced by flotation alone. (Nevada State Journal, 16 January 1933.)

This was nearly the same program that predecessors had unprofitably tried twice before, but Squires' milling plans were different. Instead of cyaniding directly after crushing and grinding, he decided to concentrate ore by flotation and send the product to a smelter. Cyanidation wasn't needed, he told reporters, because "Comstock ores float easily, with very high recovery of gold and silver values and extremely high ratio of concentration." Thus assured, company directors authorized construction of a 150-ton mill on company ground northeast of the Hale and Norcross adit near the Fourth Ward School. Completed early in 1933, it was the first milling facility in the district to treat Comstock ores entirely by flotation.¹⁶

While the new mill was under construction, contract crews continued development on three levels underground through a series of drifts, winzes, and crosscuts, using the old Hale and Norcross tunnel as the main adit. A winze inside the tunnel raised ore by electric hoist from the lower levels to loading bins, from where ore cars pulled by electric locomotives trammed it to the portal. Until the mill could be completed, Squires kept investors interested by shipping a thousand tons of the best ore in sight directly to a Salt Lake smelter without further beneficiation. It averaged \$20.53 per ton.¹⁷

For the first two years after startup there was no letup on promotion. Squires saturated reporters with details on ore quantity and development, claiming the new milling process "assures the workings of large deposits of low-grade ore at a handsome profit."¹⁸ At the opening ceremony for the new mill, Richard J. Walsh, the company's president, predicted "that our properties hold the key to what looks like the greatest revival in gold mining our present generation will witness."¹⁹

Platitudes and promises made stock jobbing easier, but the rosy optimism began to fade after a few months of active mining. The first sign of trouble emerged during the summer of 1933, when the California State Corporation Commis-

sion, questioning the mine's net worth in view of past failures, prohibited the sale of Arizona Comstock stock in California. With its market value at stake, the company immediately challenged the order and filed suit. Both sides brought in mining experts to testify at a hearing in August before a superior court judge in San Francisco. The bulk of reported testimony favored company estimates of "net ore obtainable" at \$10 million or more, and blamed the failure of previous companies on "antiquated mining methods." Ultimately the order was rescinded and stock sales resumed in the West Coast's largest market.²⁰

Loring Takes Charge

Among those who testified on behalf of Arizona Comstock was William J. Loring, a familiar name in West Coast mining circles after his association with Herbert Hoover and Bewick Moreing and Company in Australia, followed by successful management of several prominent gold mines on California's Mother Lode. During World War I, from his headquarters in San Francisco, he had built up a high-flying tungsten operation in Nevada, but that shut down when the war ended and prices collapsed.

The 1920s were hard times for Loring, both financially and domestically, for he had invested most of his assets in mines that failed. Accustomed to an urban upper-class lifestyle, his second wife spent lavishly with money he had to borrow. She tagged along reluctantly when he went to Arizona to look for "second hand mines" that might offer new opportunities, but she preferred Los Angeles to the desert heat. So for much of the time he carried on alone. In Yavapai County he put the last of his capital into a copper operation just starting near Prescott, but he lost that too when copper prices collapsed. In disgust he told a friend that he had "made nothing out of five years of isolation and hard work." Later his wife divorced him on grounds of "extreme cruelty," because, he said, "she would not live where I have had to live to try

to make a living.”²¹

While Loring was exploring in the Southwest he met and perhaps worked for a time with investors who later became involved with Arizona Comstock. Certainly Howard Squires knew him personally as well as by reputation. Both had managed or engineered mining operations in southern Nevada before coming to the Comstock—Squires as a consulting engineer in the Pioche district, and Loring as manager of a gold mine in Searchlight (perhaps at the same mine where U.S. Senator Harry Reid’s father worked before little Harry was born). Both had used flotation technology to concentrate gold ores.²²

Loring was available for consulting work when Arizona Comstock’s net worth came into question. He offered his services, made a quick inspection of the property, and confidently testified in court that the mine was worth \$10 million and the yield “may be greater.” A month later in Los Angeles, upon Squires’ recommendation, the Arizona Comstock’s board of directors hired Lor-

ing as chief consulting engineer. He moved immediately to Virginia City, glad to leave the hot Southwest and its painful memories behind.²³

Flotation and Cyanidation

During its first sixteen months of operation, the Arizona Comstock’s flotation mill processed ore mined only from old underground workings. Designed to treat 150 tons per day, the plant required much time and tinkering to maximize production. By the summer of 1933 it still had not reached full capacity. Periodically Squires assured observers that the mill was “working perfectly.” He blamed the under-utilization on a logistical bottleneck that prevented the efficient delivery of ore. Even with the installation of a new double-drum hoist and a bigger compressor to expand underground operations, however, the mill was still running at half-speed and turning out little more than a ton of concentrates a day when Loring arrived in September.²⁴



William J. Loring took over the managing directorship of Arizona Comstock in the fall of 1933. Here he is in his well-appointed office in Virginia City. (Berkley-Matthews private collection, London.)

Taking charge of daily operations after Squires was elevated to general manager, Loring announced plans to expand both mining and milling. Good ore could be found with further exploration at deeper levels, he told reporters, which would necessitate doubling and then tripling mill capacity "within the next few months." With an eye on promotion he predicted that full exploration of the properties and implementation of his plans should result in "2,571 feet of continuous ore for the mill."²⁵

The hyperbole masked realities on the ground. The projected volume and quality of mineable ore underground faced a reality test by the end of 1933. By that time only fifty-five thousand tons had been mined of the million Squires estimated to be remaining the year before, and it was questionable how much more could be economically recovered. Despite reported assays of up to sixty-seven dollars a ton on selected samples, ore grade declined as ore production increased. Dilution because of heavy ground and caving reduced the average value of mill heads, which ran only seven to thirteen dollars per ton during the period.²⁶

Recovery rates also did not meet expectations. The milling process itself was questionable. Flotation alone, as Loring and his mill boss, A. F. McFarland, found, captured only 81 percent of gold values and only 69 percent of silver. But according to a later study by the Nevada Bureau of Mines, even those rates were "greatly exaggerated." Returns per ton in 1933 averaged only \$4.28. The remaining values were slurried away to the tailings pond.²⁷

Improving the technology of Arizona Comstock operations was only part of Loring's mandate during his first six months as manager. He also had to confront the financial deficiencies that were inherent in undercapitalized and over-leveraged mines. With large sums still owed to landowners and laborers, and with creditors still awaiting repayment of loans to pay for the surface plant and equipment, the company board of directors balked at adding to the debt burden. They

wanted the estimated one hundred thousand dollars in improvements to pay for themselves with money derived from better metals recovery and more stock sales.

The unrealistic expectations of his directors meant a much slower expansion of operations than Loring had in mind. With forty years of practical experience in all aspects of mining, he was confident in his ability to keep ore quantity and quality high while expanding milling capacity and efficiency. But any major upgrades required large amounts of capital. He put on a bold front to the public, assuring reporters that the mine "has a very great future before it," but in reality the company's accountant, John Kelly, had barely enough operating revenue to meet the monthly payroll.²⁸ Loring kept pushing ahead anyway, resorting to an old strategy he had used many times before: fiscal triage. With whatever funds he had available he paid the most important creditors first, and put off the rest with excuses and promises.

The most immediate task was to increase the revenue stream by improving milling technology. For years industry literature had recommended treating gold and silver ores by some combination of flotation and cyanidation.²⁹ Even Squires had been won over to cyanidation after six months of indifferent results from floating ores that varied in content and quality. Loring's solution was to switch from oil to froth flotation, to lengthen flotation time by adding a second circuit and additional cleaner cells, and to cyanide the tailings. To reduce shipping and refining costs, he also wanted to run the flotation concentrates through a separate cyanide circuit.

Comstock milling efficiency took on added importance after December 1933. Under inflationist pressure by the silver lobby in Congress, the Roosevelt administration agreed to boost silver purchases by forty-two million ounces. The Silver Purchase Act of 1934 was a "special-interest triumph" that did little for the national economy, but it was wildly popular in the western silver states. With both gold and silver prices subsi-

dized by the government, Comstock ore offered a double bonus if its metallic values could be efficiently extracted.³⁰

The monetary stimulus added incentive to Loring's expansion plans. While carpenters and millmen enlarged the flotation plant to process three hundred tons per day, another crew started constructing buildings below the tailings pond to house the three hundred-ton cyanide plant purchased at bargain prices from a defunct silver mining operation in Rochester, Nevada—doubtless on Loring's recommendation, since he had formerly managed an adjacent tungsten mine that shared power with the Rochester operators.

Loring confidently predicted that the improvements would generate over two dollars per ton in added revenue, but he did not anticipate the financial problems that slowed construction to a snail's pace. Over several months trucks delivered filters, pumps, zinc boxes, and thirteen large redwood tanks for thickening and agitating the pregnant solution. These went into storage until the physical facilities could be completed. The first cyanide plant on the property did not begin actual operations until the summer of 1936.³¹

Mining the Surface

In the interim Loring turned to the mining side of operations. Despite the previous development work and Squires' estimated ore reserves of over a million tons, an ore shortage loomed by the end of 1933. Initially the new mine manager assumed that ore supply could keep pace with expanded mill capacity, but that notion faded quickly in light of actual operations. Monthly underground ore production reached three thousand tons and did not increase much afterward. That was barely enough to feed the existing mill, much less supply a plant three times larger.

To bring more good-quality ore to the surface required more workers, costly equipment upgrades, more timbering and backfilling, and extensive new development—including a larger

shaft and better access to mineable ore bodies than the old workings provided. Without new capital resources the mine was doomed to failure unless another economical source of ore could be found. Thus the stage was set for surface mining, Loring's enduring legacy on the Comstock.

Searching for alternative sources of ore led Loring's samplers to explore the huge fault fissure fronting the western slope of Mt. Davidson, where outcrops up to 200 feet wide rose 120 feet above the high desert floor. The obvious places to look were the piles of low-grade reserves and waste left by previous operators in glory holes on the Chollar and Savage sections of the lode. Promising tests there led to more extensive sampling and the discovery of "large tonnages of payable ore" found along both the "width and length" of the lode.

By the spring of 1934 Loring had developed a new plan designed to supplement underground ore production. Soon surface mining would become the main source of ore. Underground operations came to a virtual halt "because of the low cost of ore extraction from the lode outcrop," a Nevada journalist reported. "The [surface] method of mining," Loring announced with characteristic conceit, "virtually quarrying the ore from wide faces, loading with power shovel and transporting by truck, is the cheapest and most effective known."³²

Mining the surface began in earnest in 1934 with a one-and-a-half cubic yard power shovel and two five-ton trucks operated by the Isbell Construction Company, a Reno contractor. Production rose rapidly, from a daily average of 150 tons in May to 300 tons by August. It was an easy haul over a graded downslope to the primary and secondary crushers in front of the mill only a third of a mile away. The crushed ore moved by belt conveyor to a Marcy ball mill, then to a classifier for sorting into sands and slimes. In the original circuit the sands were reground and the slimes sent to a conditioner and then to eight Fahrenwald flotation cells. The concentrate from the first two cells was sent to a thickener and on

to an Oliver filter for drying. The final step was to sack the product for shipment to the Selby smelter for refining.³³

As surface mining expanded, the character of the ore changed, with less sulfide ore and more oxidized minerals associated with silver. The gold was free-milling, but a ton of ore carried only 0.10 ounces of gold and 4.0 oz. silver. At 1930s metal prices, each ton was worth \$5.82 if all of the values were recovered. Not even refineries could do that, however. At Arizona Comstock the enlarged mill now had plenty of ore, but milling efficiency dropped nearly 20 percent from previous levels. Concentrate values averaged only \$4.00 per ton. The silver recovery rate alone fell to 52 percent—a far cry from the 92 percent predicted by flotation tests in 1932.³⁴

For the next two years Loring and McFarland struggled to find the right metallurgical combination to improve recovery rates. They added more powerful and sophisticated grinding and sorting

machinery, experimented with various reagents and frothers, and appended new cells and circuits. By 1936 the mill had fifty flotation cells but still recovered only 79 percent of the gold and 59 percent of the silver values.

The mediocre results reinforced Loring's growing belief that the real answer was to cyanide both concentrates and tailings, which would require a second small cyanide plant in addition to the big tailings plant that was still not finished after two years of intermittent construction. He gave voice to his frustration in a special report covering the previous three years of operations: "It will be seen how wasteful it is to depend upon [a] plant of the kind that is incomplete and out-of-date for low costs and metallurgical standard recoveries."³⁵

Money Troubles

Criticizing the directors for being "wasteful" and shortsighted was a defensive reaction to



Loring initiated open-cut mining in May 1934 with a 2.5-cubic-yard shovel and a dump truck. This image shows the cut in 1937, a few months before the mine closed. (Berkley-Matthews private collection, London.)

Loring's own shortcomings as mine manager and financier after forty years in the business. In pre-war London as a partner with Bewick Moreing and Company, in California's Mother Lode, and in Nevada during World War I, he had organized mining syndicates and parlayed mining assets into huge sums for operating capital. As an investor he had lost more money than he had made, but the experience he gained as a deal-maker for other investors had made an impression on the directors of Arizona Comstock.³⁶ They elevated him to company president and managing director following the death of the first president and the resignation of Howard Squires.³⁷

Loring's first chance to demonstrate the power of his financial connections came a few months after he was hired as consultant. It didn't go over well with Herbert Hoover, now retired to Palo Alto after his stinging defeat in the 1932 election. For months Loring had tried to renew acquaintances and keep Hoover interested in his old colleague's business affairs. Hoover was at first polite and noncommittal, but Loring's persistent and obsequious special pleading only irritated the ex-president.

Seemingly oblivious to Hoover's reservations, Loring mentioned his connections with Hoover to Alexander Coplin, an unscrupulous Seattle broker dealing in mining stock. Loring's relations with Coplin dated from the late 1920s, when the broker had helped him promote an Arizona copper company that Loring had invested in heavily and later tried unsuccessfully to unload before it folded.³⁸

In the days before federal regulation, stock peddling was often a gambler's game that lured unwary investors with slick brochures and deceptive information. Coplin used both Loring's and Hoover's names in promotions to businessmen and potential investors. When Hoover found out he was furious, writing to Loring:

Various . . . persons have been inquiring of me about stock in the company because

of the representation that the business is vouched for by one of my former associates. It seems pretty rough for people to be selling stock by such tricks. It would certainly stamp a business [as] having to seek merits outside of the mine and their [sic] own reputation. I have made no public comment on it but frankly I don't like it.³⁹

Stung by Hoover's criticism, Loring wrote defensively: "I want you to understand that our connection was an honorable one, and one that I value very highly, and anything that I may say will certainly not injure you." But that did not stop him from dealing with Coplin, whose firm had bought up 90 percent of the outstanding company stock for about 60 percent of its one dollar par value.⁴⁰

The Coplin arrangement still left two hundred thousand company shares not accounted for. How many were held by legitimate investors and how many were treasury shares is not clear, but enough remained on the company's books to provide the basis for another deal. In December 1934 the directors met in Chicago to consider the company's financial status. Needing a quick infusion of cash to speed up mill construction, they approved a seventy thousand dollar loan Loring had arranged with General Securities, a financial services company in the city's business district, using Arizona Comstock treasury shares as collateral. As a preferred creditor, General Securities would be first in line if the company defaulted. With all the hype in 1934 that surrounded Arizona Comstock's lead in the Comstock "revival," bankruptcy seemed a low risk.⁴¹

The risk level shot up a year later because of a stock scandal involving Arizona Comstock's main broker, Alexander Coplin. Loring later claimed the company had fifteen hundred shareholders, but that figure is suspect because of Coplin's marketing tactics. In a scheme later labeled "wash trading," Coplin's agents sold thousands of shares



A stock scandal involving Arizona Comstock shares crippled the company's ability to raise money after 1935.
(Nevada State Journal, 16 January 1933.)

to each other and then quietly cancelled the deals. Only the buy orders were registered, however, thus creating a market buzz that helped sell stock to gullible investors at inflated prices.⁴²

Wash trading and other dodgy marketing practices came under fire during the First New Deal. In a process that historian David Kennedy has called the “rationalization of capitalism,” Congress passed the Securities Act in 1933 and followed that the next year with the Securities Exchange Commission. The first law established strict federal guidelines governing all financial transactions in interstate commerce; the second required publicly traded businesses to disclose—and to verify by independent audit—detailed information about their financial status. Fraudulent stock jobbing, secret deals, and undisclosed financial assets and liabilities—these and other practices were now outlawed by federal statute, with violators subject to civil or criminal prosecution.⁴³

Hardly had the ink dried on this new legislation when Alexander Coplin and his associates

felt the heat of an F.B.I. probe into their dubious marketing practices. Before the investigation, an S.E.C. filing had estimated the average price of Arizona Comstock shares at \$1.67. In September 1935 Coplin and fourteen others across the country were indicted on ten counts of mail fraud involving a half million company shares. By buying and selling to each other, they were able to “create the idea that there was a great demand for the stock,” said the U.S. attorney in charge of the case. During the lengthy trial in Seattle, one novice investor testified that she had purchased \$650 worth of company stock “on representations that it would increase in value from \$3.25 to \$9 a share.” The defendants were eventually found guilty of manipulating the market—the first convictions under the Securities Act.⁴⁴

Not surprisingly, the Coplin case hurt the regional market for Arizona Comstock shares, but without adversely affecting the reputation of the company’s president—at least at first. Emphasizing “long-term operations” rather than quick profits, Loring reassured the board of directors that dividends would be forthcoming as soon as they provided the money to complete his projected upgrades, now estimated to cost three hundred thousand dollars. The board voted him in again, but could not agree on a new funding plan. He went ahead anyway, driven by the stubborn conviction that he could make the mine pay.

Mining and Milling during the Last Two Years of Arizona Comstock

By the beginning of 1936 Loring was convinced that cyanidation was the answer to Arizona Comstock’s milling problems. The flotation plant, which had started with such promise three years earlier, had become an expensive lesson in the pitfalls of engineering overconfidence. Despite three years of nearly constant changes, additions, and adjustments to the flow chart, the mill could extract no more than two-thirds of the gold and silver values in oxidized ores that contained

clay and soluble salts. Other companies that had followed Arizona Comstock's lead were having the same trouble. It was still an economical reduction process if used in conjunction with cyanidation, but flotation alone simply did not work well with Comstock ores.⁴⁵

After three years of planning, cyanidation at Arizona Comstock finally began in August 1936, after a small auxiliary plant was built to treat low-grade concentrates coming off the cleaner cells from the flotation circuit. In October Loring proudly showed off the company's "first bar of bullion" produced by cyanidation, a forty-eight pound ingot. It went to the smelter along with a shipment of high-grade flotation concentrates and a small amount of free gold recovered in jigs and traps.⁴⁶

The five-ton auxiliary facility was only a minor addition compared with the three hundred-ton cyanide plant that still awaited completion after two years of intermittent construction. When fully operational it was expected to recover 95 to 98 percent of the values left in every ton of flo-

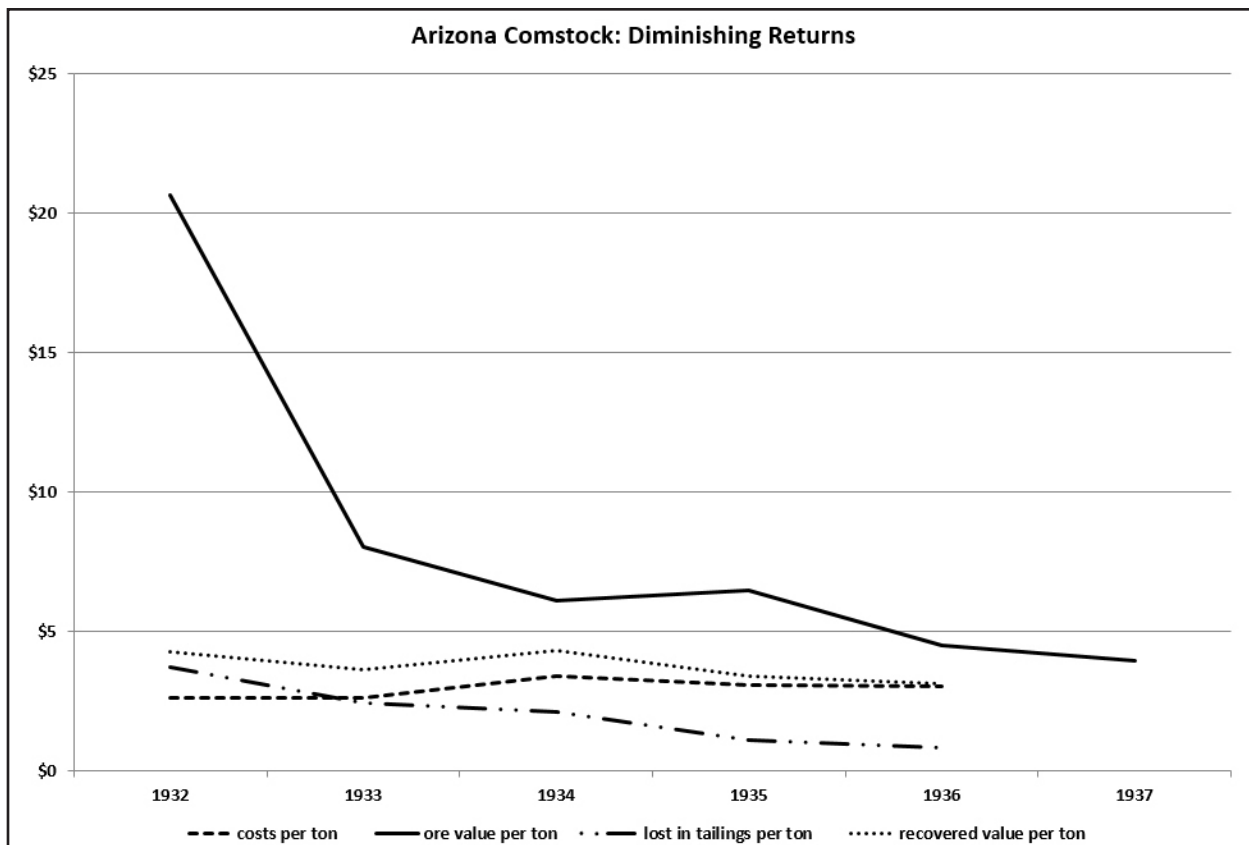
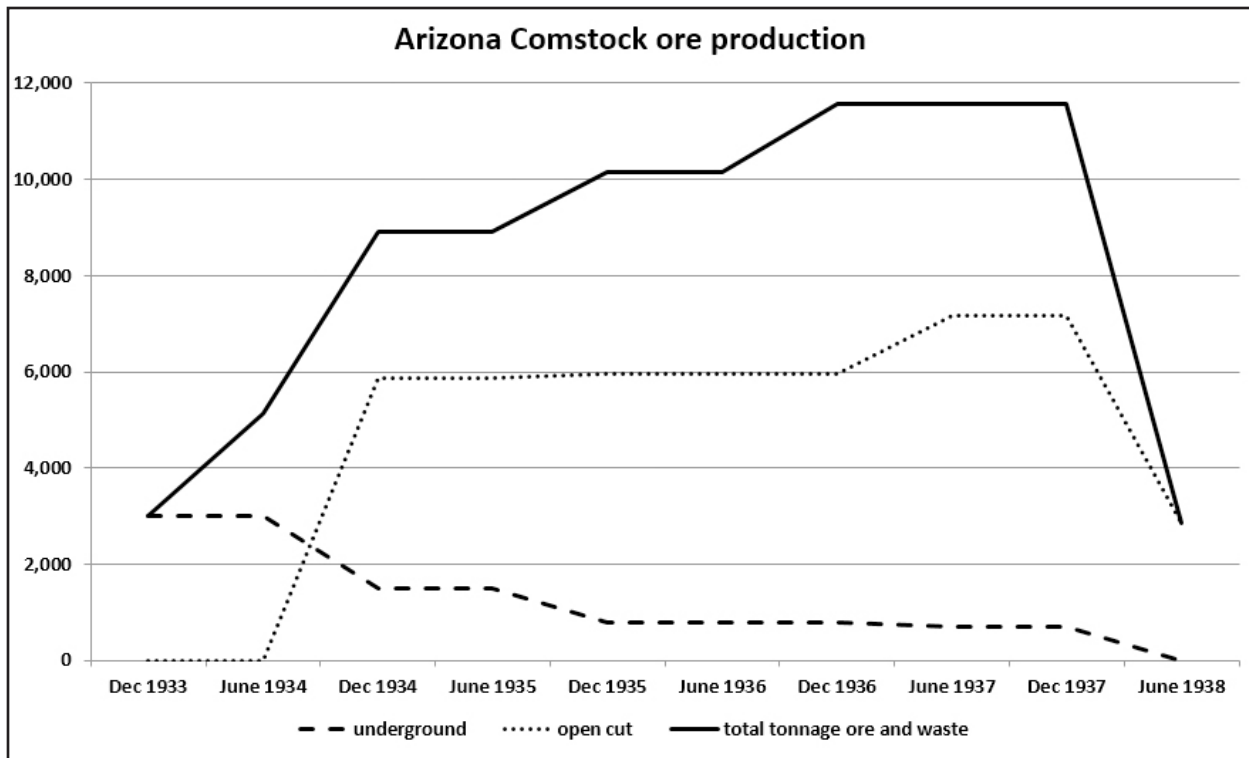
tation tailings. With mill-head values declining to less than six dollars a ton and costs averaging just over three dollars per ton as the volume of ore coming from the open cut increased, the projected savings became a critical objective for the long-term survival of Arizona Comstock.⁴⁷

In the short run the company kept alive through a combination of increased production and cost control. Excessive frugality, however, seemed pennywise and pound foolish to one critic: "The management used unskilled labor where a trained mechanic should have been used. The poor arrangement of machines and necessity of constant repairs necessitates an excessive number of operators and laborers."⁴⁸

Loring seemed oblivious to criticism and proud of the mine's growth. Ore coming from the open cut averaged more than ten thousand tons per month between November 1935 and September 1937, with monthly gross revenue topping fifty thousand dollars from high-grade flotation concentrates, cyanided low-grade, and bullion from jigs and traps.



The 150-tpd flotation plant on the Hale and Norcross property west of the Fourth Ward School. (Berkley-Matthews private collection, London.)



Production never lagged even after two massive landslides in 1936 and a third in 1937 dropped both ore and waste into previous excavations. A later estimate concluded that two-and-a-half tons of waste had to be removed for every ton of ore produced on the surface. Loring told shareholders in 1937 that the cavings had been planned and had actually opened “wide parallel ore-channels” for development, but he never got a chance to prove his claim. Another massive slide during the winter of 1937-38 buried the west wall of the cut and stopped surface mining altogether on Arizona Comstock’s property. For a few weeks his crews drew surface ore from the adjacent Gould and Curry property under an agreement with the Comstock Tunnel and Drainage Company, but monthly production fell by 75 percent.⁴⁹

The end came quickly for both the Arizona Comstock company and its president. Loring reported an operating loss of \$114,525.92 for

1937, but tried to offset the bad news by pointing out the company’s \$700,000 asset in the form of 381,000 tons of tailings still awaiting cyanidation. “Stockholders should not be discouraged,” he said, because he had plans for reorganization that would raise the necessary funding to complete the long-delayed tailings plant.

The red ink was too much for the directors, however. On June 1, 1938 they shut down all operations, then in a matter of days sacked Loring and declared bankruptcy. Later that year James Leonard redeemed the property on behalf of the Tunnel Company by paying its five thousand dollar tax bill.⁵⁰

Loring left Arizona Comstock a broke and bitter man. Blaming others was characteristic of Loring’s inflated self-image. The mine’s failure, he said, was the result of poor decisions by the company’s board of directors. They did not follow his recommendations and did not help raise



The Loring Pit in 2015 still shows benching scars from open-pit mining in the 1970s and early 1980s, but is slowly succumbing to the erosive forces of nature. (Author’s collection.)

the money to complete the cyanide plant. When they turned against him he took the rejection as a personal affront. "I remained in Virginia City," he told a friend, "through loyalty to 1500 stockholders, and what did I get, nothing, not even good bye." As a parting shot he wrote in a brief autobiography: "I will say that if an engineer with a clean and decent reputation gets into a position where he has to submit to the dictation of men in power who insist upon absurd methods and when the results are not satisfactory, God help the engineer."⁵¹

The mine itself had an intermittent afterlife. In the fall of 1938 Leonard sold it for \$620,000, the amount still owed to the mine's creditors. Two subsequent operators tried their luck with the property before World War II, but lost more money than they made. For twenty years the mine was shut down, but it had another period of activity as an open-pit operation during the gold boom of the late 1970s and early '80s. After it closed for good, the chief geologist for United Mining Corporation, its last operator, estimated that 419,000 tons of low-grade ore remained on the surface in the dumps, tailings, and the pit itself. Since then anything resembling ore has been buried by landslides and reclamation efforts. All the Comstock liars have (presumably) disappeared, and even Mark Twain would hardly recognize Loring's Pit today as a hole in the ground.⁵²

Loring's Legacy

Loring's Cut was not the first surface mining effort on the Comstock Lode, nor would it be the last. Dozens of cuts, pits, gouges, and prospects have scarred the Comstock's landscape in its 150-year history. Compared with today's gigantic open pit mines on the Carlin Trend, the Loring Cut was little more than a glory hole.

That the "Middle Mines" ultimately failed to make a profit for any of their operators after 1934 was not a fault of management or even a lack of pay dirt. Any mineral deposit has value if the marginal utility is favorable. In hindsight, the underground reserve values were inflated, the operating costs underestimated, and the decision to use flotation was not a good choice for Comstock ores. Loring did the best he could with the geological data, technology, and financial resources available to him.

Although his last big venture was unsuccessful, Loring believed he was leading the Nevada mining industry in a new direction and the contemporary mining press readily agreed. In 1936 a journalist praised him for showing "the way to success in [a] big-scale, low-grade operation." Two years later, after the mine had closed, another reporter concluded that Loring had "originated" a method that had been "adopted elsewhere in Nevada with outstanding economic success." One measure of that success is the scar still visible at the foot of Mt. Davidson that bears his name.⁵³ ■

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Notes:

1. *Nevada State Journal* (Reno), 19 June 1920, 6. The presence of galena and other sulphides in Comstock ores significantly limited the effectiveness of treatment by pan-amalgamation, but recovery rates differed depending on location. In the 1870s, tests of ore from the Savage Mine showed only 70 percent gold and 32.5 percent silver recovered, whereas the same tests of Kentuck ore at Gold Hill recovered over 81 percent gold and silver values. Ernest Oberbillig, "Development of Washoe and Reese River Silver Processes," *Nevada Historical Society Quarterly* X (Sum. 1967): 28.
2. *Nevada State Journal*, 7 June 1920, 6; 11 June 1920, 4; *Oakland [CA] Tribune*, 14 July 1920, 19.
3. *Nevada State Journal*, 7 Aug. 1922, 3.
4. *Nevada State Journal*, 19 June 1920, 6.
5. *Nevada State Journal*, 13 Dec. 1926, 3; Ira B. Joralemon, "Report on Arizona Comstock Corp. Virginia City, Nevada, 28 April 1934," 1-2, Special Collections 120000149, University of Nevada, Reno (hereafter UNR).
6. *Reno Evening Gazette*, 30 Aug. 1922, 2; 26 Jan. 1923, 3.
7. *Reno Evening Gazette*, 13 Nov. 1924, 6; 19 Nov. 1924, 3; *Nevada State Journal*, 13 Dec. 1926, 3.
8. *Nevada State Journal*, 13 Dec. 1926, 3; *Reno Evening Gazette*, 25 May 1928, 12.
9. A. J. Moore, cited in the *Nevada State Journal*, 25 Oct. 1926, 3.
10. *Reno Evening Gazette*, 25 May 1928, 12; 27 Sep. 1929, 10.
11. *Nevada State Journal*, 17 June 1932, 1, 3; Grant H. Smith, *The History of the Comstock Lode* [with new material by Joseph V. Tingley] (Reno: Nevada Bureau of Mines and Geology, 1998), 291-6.
12. *Reno Evening Gazette*, 30 Sep. 1932, 10.
13. David M. Kennedy, *Freedom from Fear: The American People in Depression and War, 1929-1945* (New York: Oxford Univ. Pr., 1999), 154-5. For annual market prices for gold and silver between 1790 and 1999, see historic charts at www.kitco.com.
14. Mary Hill, *Gold: The California Story* (Berkeley: Univ. of California Pr., 1999), 248. For gold's impact on domestic mining and the effect of international monetary policy, see: *New York Times*, 22 May 1932, E6; 27 Aug. 1933, N9; 3 Sep. 1933, XX2; 29 Oct. 1933, XX2; 22 Dec. 1933, 2.
15. *Reno Evening Gazette*, 30 Sep. 1932, 10; *Nevada State Journal*, 5 Dec. 1932, 3; 16 Jan. 1933, 1, 6; Joralemon, "Report on Arizona Comstock Corp.," 2. A copy of the articles of incorporation are in the California State Archives, #152838.
16. *Nevada State Journal*, 17 June 1932, 1, 3; *Reno Evening Gazette*, 10 June 1938, 2.
17. *Reno Evening Gazette*, 30 Sep. 1932, 10; *Nevada State Journal*, 3 Oct. 1932, 3.
18. *Nevada State Journal*, 17 June 1932, 1, 3; 3 Oct. 1932, 3; 16 Jan. 1933, 1, 6; *Reno Evening Gazette*, 30 Sep. 1932, 10.
19. *Nevada State Journal*, 16 Jan. 1933, 7.
20. *Nevada State Journal*, 12 Aug. 1933, 6.
21. *Prescott [AZ] Evening Courier*, 27 Apr. 1932, 2; *Nevada State Journal*, 25 May 1934, 5; Loring to Charles H. Segerstrom Sr., 3 Feb. 1935; Loring to Charles H. Segerstrom Jr., 26 Oct. 1944, both in Segerstrom Collection, Holt-Atherton Library, Univ. of the Pacific (hereafter HAL). See also: Loring biographical sketch [typescript], 1932, in the Loring Collection, Hoover Institution Archives, Stanford University.
22. In 1919-20 Loring had managed two consolidated mines in California that had floated gold ore and were in the process of adding a cyanide circuit when fire destroyed the surface plant. See W. J. Loring, "Report on Properties of the Pacific Coast Gold Mining Corporation, Oct. 1, 1921," in A. D. Stevenot papers, Segerstrom Collection, HAL. As a consulting engineer in the late 1920s, Squires was a partner in the engineering firm of Squires-Gemmell when the Combined Metals Reduction Co. developed the first successful commercial separation of complex Pioche lead-zinc ores by selective flotation. *Reno Evening Gazette*, 5 July 1927, 7; *Nevada State Journal*, 28 Dec. 1931, 3; 17 June 1932, 1, 3. See also Geo. H. Holmes, Jr., "Mining and Milling Methods at the Caselton Mine, Combined Metals Reduction Co., Pioche, Lincoln County, Nev." (US Bureau of Mines *Information Circular* 7586, Nov. 1950).
23. *Nevada State Journal*, 4 Sep. 1933, 3.
24. *Reno Evening Gazette*, 24 Jan. 1933, 8; *Nevada State Journal*, 10 July 1933, 2.
25. *Nevada State Journal*, 4 Sep. 1933, 3.
26. *Reno Evening Gazette*, 30 Sep. 1932, 10; *Nevada State Journal*, 11 Dec. 1933, 2.
27. *Reno Evening Gazette*, 22 Nov. 1933, 6; 9 Dec. 1933, 7; *Nevada State Journal*, 8 Oct. 1933, 1-2; Loring and McFarland, "Arizona Comstock Corporation: Details of Operation Covering Period of Three Years and Four Months (1936)," 1, UNR 12000068; Carl Stoddard and Jay A. Carpenter, "Mineral Resources of Storey and Lyon Counties, Nevada," Nevada State Bureau of Mines *Bulletin* 44, no. 1 (Mar. 1950): 33.
28. *Nevada State Journal*, 4 Sep. 1933. In November 1933, the company reported mine revenue of \$19,694, of which it spent \$13,000 on wages. (*Nevada State Journal*, 11 Dec. 1933, 2.)

29. For examples of contemporary industry recommendations, see A. W. Fahrenwald, *The Cyanide Process: Its Control and Operation* (New York: John Wiley & Sons, 1918); *Reno Evening Gazette*, 25 Feb. 1927, 9; "American Cyanamid, Flotation, Cyanidation and Reagents," excerpted in *Nevada Mining Journal*, 1 Nov. 1931, 3.
30. *New York Times*, 31 Dec. 1933, E7; Arthur M. Schlesinger Jr., *The Coming of the New Deal* [Age of Roosevelt series, v. 2, 1933-35] (Boston: Houghton Mifflin, 1959), 248-52; H. Herbert Hughes, *Minerals Yearbook 1937: Year 1936* (Washington, D.C.: USGPO, 1937), 431.
31. *Nevada State Journal*, 9 Apr. 1934, 6; *Reno Evening Gazette*, 26 Sep. 1934, 6. For Loring's connection with Rochester, see the *Lovelock [NV] Review Miner*, 10 Apr. 1925, 1, in Segerstrom Collection, HAL; William G. Emminger, "Reminiscences," 1965, NC337, UNR.
32. *Nevada State Journal*, 9 Oct. 1922, 3; 9 Apr. 1934, 6; 13 May 1935, 5; *Reno Evening Gazette*, 11 Apr. 1934, 6; Joralemon, "Report on Arizona Comstock Corp.," 2-3.
33. *Nevada State Journal*, 17 June 1932, 1, 3; Loring and McFarland, "Details of Operation," 1-2; *Nevada State Journal*, 8 Oct. 1933, 1-2.
34. Percy S. Gardner and Jay A. Carpenter, "Present Day Milling Plants on the Comstock Lode," typescript, 1935, 12000006, UNR; *Nevada State Journal*, 16 Jan. 1933, 1; *Reno Evening Gazette*, 26 Sep. 1934, 6.
35. Loring and McFarland, "Details of Operation," 2-4.
36. During the depression of 1920-21 he privately admitted to a client: "Unfortunately when I have a chance to make money, I do not appear to do it, and I do not get very much assistance either in making money." W. J. Loring to Edward A. Clark, 7 Dec 1921, Segerstrom Collection, HAL. A former business partner, C. H. Segerstrom, concluded that Loring "was not as much of a financier as he was a miner and having been brought up under the tutorage of English engineers, capital does not mean anything to him. If he desires to do something, he does not stop to think where the money is coming from, but goes ahead and does it and then considers where he is going to raise the money. Therefore, his propositions have sometimes failed." Charles H. Segerstrom to C. F. Wentz, 4 Sep. 1934, Segerstrom Collection.
37. In May 1933 President Walsh caught the flu while visiting Virginia City and died a few days later. Loring took over after an interim of several months. Howard Squires continued in a management capacity until 1935, but took little part in operations after a dispute with the company's principal stock broker, Alexander Coplin, who later was a defendant in the mail fraud trial described later in this article. *Nevada State Journal*, 28 July 1934, 7; 30 July 1934, 3; *Reno Evening Gazette*, 17 Apr. 1935, 10; 10 July 1935, 6; 9 Oct. 1935, 6; 12 Aug. 1936, 8; 10 June 1938, 2.
38. W. J. Loring to Herbert Hoover, 16 Dec. 1933, Wax Collection, Tuolumne County Historical Society, Sonora CA (hereafter TCHS).
39. Herbert Hoover to W. J. Loring, 18 Dec. 1933, Wax Collection, TCHS.
40. W. J. Loring to Herbert Hoover, 16 Dec. 1933, Wax Collection, TCHS; *Nevada State Journal*, 10 Dec. 1934, 5; *Reno Evening Gazette*, 10 Sep. 1935, 12.
41. *Nevada State Journal*, 10 Dec. 1934, 5; 7 Oct. 1935, 5; *Reno Evening Gazette*, 25 Nov. 1936, 6; 15 Apr. 1938, 8; 14 Jan. 1939, 16.
42. *Reno Evening Gazette*, 10 Sep. 1935, 12.
43. Schlesinger, *Coming of the New Deal*, 434-45; Kennedy, *Freedom from Fear*, 367-8.
44. *Nevada State Journal*, 3 June 1935, 4; *Reno Evening Gazette*, 9 Sep. 1935, 2; 10 Sep. 1935, 12; 31 Dec. 1935, 3; *Ellensburg [WA] Daily Record*, 15 Oct. 1935, 3; *Berkeley [CA] Daily Gazette*, 26 Dec. 1935, 2; (Spokane, WA) *Spokesman-Review*, 2 Mar. 1937, 10. Arizona Comstock stock was sold over the counter and not listed on the mining exchanges.
45. *Reno Evening Gazette*, 30 Dec. 1933, 6; Gardner and Carpenter, "Milling Plants," UNR 12000006; Smith, *History of the Comstock Lode*, 297.
46. *Reno Evening Gazette*, 25 Nov. 1936, 6; *Prescott Evening Courier*, 30 Oct. 1936, 7.
47. *Nevada State Journal*, 28 Dec. 1936, 5; *Reno Evening Gazette*, 8 Apr. 1936, 8.
48. C. R. Morris to James M. Leonard, 11 Feb. 1938, in MS collections, TCHS.
49. *Nevada State Journal*, 15 Feb. 1937, 5; 17 May 1937, 5; 19 July 1937, 5; 28 Mar. 1938, 5; *Reno Evening Gazette*, 15 Apr. 1938, 8; Stoddard and Carpenter, "Mineral Resources of Storey and Lyon Counties," 34.
50. *Reno Evening Gazette*, 19 Oct. 1938, 6; 14 Jan. 1939, 16.
51. "A Chronological History of the Mining Experience of W. J. Loring," typescript, c. 1938, in Loring Collection, Hoover Institution Archives; W. J. Loring to C. H. Segerstrom, 24 Mar. 1939, Segerstrom Papers, HAL.
52. *Reno Evening Gazette*, 15 Apr. 1938, 8; 22 Sep. 1938, 16; *Nevada State Journal*, 30 May 1938, 4; 17 Mar. 1941, 3.
53. *Nevada State Journal*, 28 Dec. 1936, 5; 1 Aug. 1938, 5.