

## **BONANZAS & BORRASCAS – A COMSTOCK MINING HISTORY**

**[B]**

### **The Nevada Perspective in Post-Civil-War America: Overview of Nevada Mining, Geology of Comstock Lode**

The discovery of ore during the late 1850s in the western part of the Idaho territory laid the foundation for America's second mining boom. The first boom, a decade earlier, was the California gold rush, and the second was the Comstock, which yielded up both gold and silver. President James Buchanan had signed the bill that created the Nevada Territory in March 1861. By 1863 with 10,000 to 15,000 residents Nevadans voted overwhelmingly for statehood in spite of the fact that the Congress failed to pass an enabling act. A state constitution was written in late 1863, but it failed to win ratification. Faced with an uncertain presidential election in 1864 Abraham Lincoln and the Republicans urged several western territories to apply for statehood. Only Nevada completed the process. A new constitution was approved in September 1864, and Nevada officially entered the Union in October 1864 in time to participate in the November presidential election and the ratification of the Thirteenth Amendment.<sup>1</sup> It is unlikely, of course, that Nevada's rapid progress toward statehood would have occurred without the mining boom no matter how compelling the election calculus might have been.

By the middle of the 1860s when the territory become a state hundreds of mining claims had been registered across the state. In his 1865 Report to the 3<sup>rd</sup> Session of the Legislature (1867) the Surveyor-General (then responsible for gathering information about mining) made the following observations:

From this discovery [i. e. Comstock] resulted the marvelous growth of Nevada. Immediately the lode was claimed for miles; an unparalleled excitement followed, and miners and capitalists came in great numbers to reap a share of the reported wealth. The few hardy prospectors, exploring the mountains for hidden wealth, soon counted their neighbors by thousands, soon walked along miles of busy streets called into existence by the throng of adventurers, and soon prospectors were ransacking almost every part of the State (at present) of Nevada in search of silver lodes.<sup>2</sup>

Nevada had other noteworthy discoveries during the 1850s and 1860s but none comparable to the Comstock. The Surveyor-General's 1866 Report presented to the same 3<sup>rd</sup> Session (1867) of the Legislature identified more than 40 operations with claims along the Comstock. Although only about half of the claims were productive, they included the well-known companies of Gould & Curry, Savage, Hale & Norcross, Yellow Jacket and Crown Point, all of which would participate in the Comstock boom of the next decade.<sup>3</sup>

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<sup>1</sup> James W. Hulse, *The Silver State, Nevada's Heritage Reinterpreted*, 2<sup>nd</sup> edition (Reno & Las Vegas: University of Nevada Press, 1998), 74-84.

<sup>2</sup> "Annual Report of the Surveyor-General of the State of Nevada for the Year 1865" in *Journal of the Senate and Appendix*, 3<sup>rd</sup> Legislative Session (1867), 20.

<sup>3</sup> "Annual Report of the Surveyor-General of the State of Nevada for the Year 1866" in *Journal of the Senate and Appendix*, 3<sup>rd</sup> Legislative Session (1867), a fold-out before p. 29. Also a list of mills in Story and Lyon Counties.

From the earliest days of statehood the mining industry figured prominently in government planning at the state and the local level. For a decade or more the most prominent mining official was the mineralogist. The first mineralogist was appointed for the biennium, 1864-1865, even though the Office of the Mineralogist was not established by law until 1866. In 1869 the Legislature changed the office from appointive to elective, effective in 1871. As a cost-cutting measure it abolished the office in 1877, effective 1878.<sup>4</sup> Once the mineralogist was appointed he instead of the surveyor-general was responsible for keeping the Legislature informed about the mining industry. He collected data on revenues, costs and yields, on future discoveries, on new technologies and on special circumstances affecting individual mining districts. In addition to the mineralogist's reports the controller, as Nevada's chief auditor, collected data on ore production. Each quarter he received reports and revenues from county assessors who were directly responsible for assessing and collecting taxes on mineral output within their counties. The quarterly report known as an "Abstract Statement" contained information on ore tonnage, yields, costs and net value for operations of individual companies. That information was then published for each county in the controller's biennial reports to the Legislature. His statistics had a more consistent and systematic character than the mineralogist's statistics, and therefore they have become the basis for the analysis of the numeric series on ore production in the discussion that follows.<sup>5</sup>

A further word about Nevada's tax system may be useful in regard to these data. How to raise enough revenue to launch the new state and in particular to build the infrastructure across such an arid and rugged terrain was a continuing challenge for local and state government. Not surprisingly during the boom years mining assessments added substantial funds to government coffers. These receipts were allotted by formula to state and county government. In addition both the county and the municipality assessed the value of property owned by mining and milling companies. None of the revenue from the property tax, so far as I could determine, entered the state treasury. Given the magnitude of the boom on the Comstock the governments of Virginia City, Storey County and Nevada earned hundreds of thousands of dollars per year from the mining assessments and property taxes. They may also have had substantial expenses within the influx of tens of thousands of person. And then in a matter of a few years as mining operations fell on hard times and both mining and property assessments plummeted, the public coffers were drained and not easily replenished. Fewer people, of course, required fewer services, but the remaining revenues were barely sufficient to maintain minimal public services.

Two components of the quarterly assessment statements - total tons and values - provide the foundation for the construction of the database on ore production at the Comstock and in Nevada.<sup>6</sup> Across the state the reported tonnage of extracted ore plus

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<sup>4</sup> Statutes, 1866, State of Nevada, Chapter CVI, 206 and Statutes, 1877, Chapter XIX, 59.

<sup>5</sup> The Biennial Reports (actually two Annual Reports) of the Controller appear in the Appendices of the Legislative Reports from the 3<sup>rd</sup> Legislative Session (1867) through the 13<sup>th</sup> Legislative Session (1887). I have used the Reports on file at the Nevada State Archives and Library.

<sup>6</sup> In the following chapters I will examine the mining assessments in greater detail. Here I am interested in presenting some totals for individual counties based upon reports to the State Controller. The Controllers' annual reports to the biennial Legislative sessions were broken down into quarters. The last or eighth quarter of a biennium (October-December) was not included because the data were not yet available for the

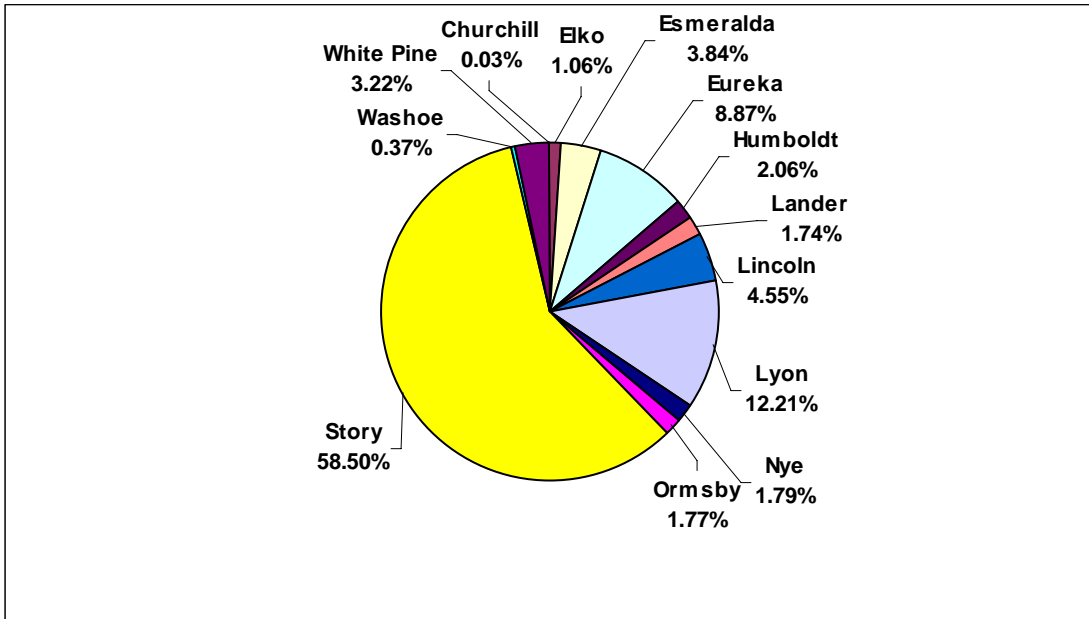
tailings between 1867 (the first year with usable data) and 1885 was 11.6 million for an average of 610,000 tons each year. Not surprisingly, almost 60 percent of the total tonnage came from Story County. The next three largest county producers were Lyon (next to Story), Eureka and Lincoln, but their total share was barely half of Story's. Figure 4 shows the percentage of ore extracted in tons for each county during the twenty years. Extracted ore contained a mixture of gold and silver, and while the proportions varied from county to county and mine to mine, a common ratio was 40 percent gold to 60 percent silver. About half of the total tonnage - between 800,000 and 900,000 tons per year - was extracted between 1872 and 1878, which, as Figure 5 illustrates, coincided more or less with the bonanza on the Comstock.<sup>7</sup> Tonnage figures reveal a more dynamic state-wide mining industry than might be deduced from percentages alone. In the late 1860s nearly all the recorded tons came from Story County. As other counties reported more and more discoveries, however, Story's share dropped below 60 percent by 1873. The Comstock bonanza pushed Story's percentage back up over 60 percent through 1877 and as high as 73 percent in 1876. From 1878 through 1885 Story's share fell again and more sharply than before. It reached a low of 27 percent in 1881 before recovering somewhat to 53 percent by 1885. As important as Story County was to Nevada mining from 1865 to 1885, it was not the only county to post impressive discoveries and yields. Although Story County was never seriously challenged in terms of total tonnage, its success combined with that of several other counties served to ignite an enthusiasm among public officials and private investors for a bright, long future in mining. Just as the Comstock boom was short-lived so too were booms in other areas. The rapid ascent and the equally rapid descent of Comstock production in the 1870s might well have been ample warning of mining's vicissitudes, but they went unheeded in part because other districts showed promise even to the extent of not just supplementing but supplanting the Comstock. Of course mining booms have always had a way of distorting the future.

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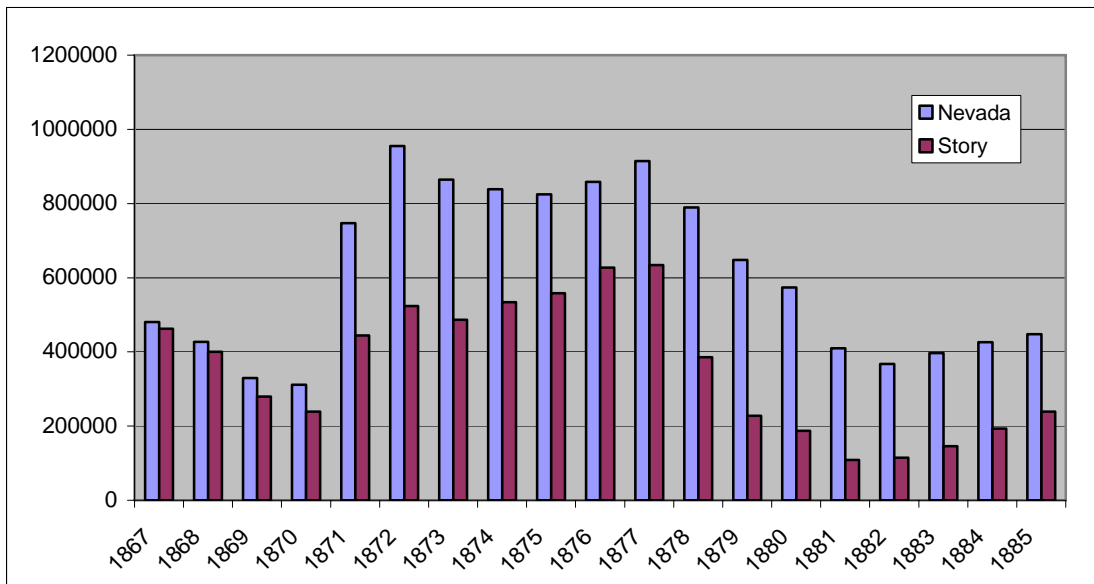
Legislative session that began in January of the next year. The final quarter of the previous biennium would be the first quarter of the next biennial report. For example, for the 5<sup>th</sup> Biennial Legislative Session, starting in January 1871, the quarterly reports ran from the fourth quarter of 1868 through the third quarter of 1870. In order to create annual figures, I have reorganized all quarterly reports into conventional twelve-month, January-to-December calendar years. Therefore, I could not use the totals from the Controllers' Reports. Some of the Controllers' Reports had inaccurate quarterly totals so that all the figures from the quarterly totals to the annual totals have been recalculated. My series from the Controllers' Reports will not agree with other published series based also on the Controllers' Reports.

<sup>7</sup> It should be pointed out that to get this much ore required many times this quantity in dirt, rock, clay, etc. to be removed underground to reach the veins.

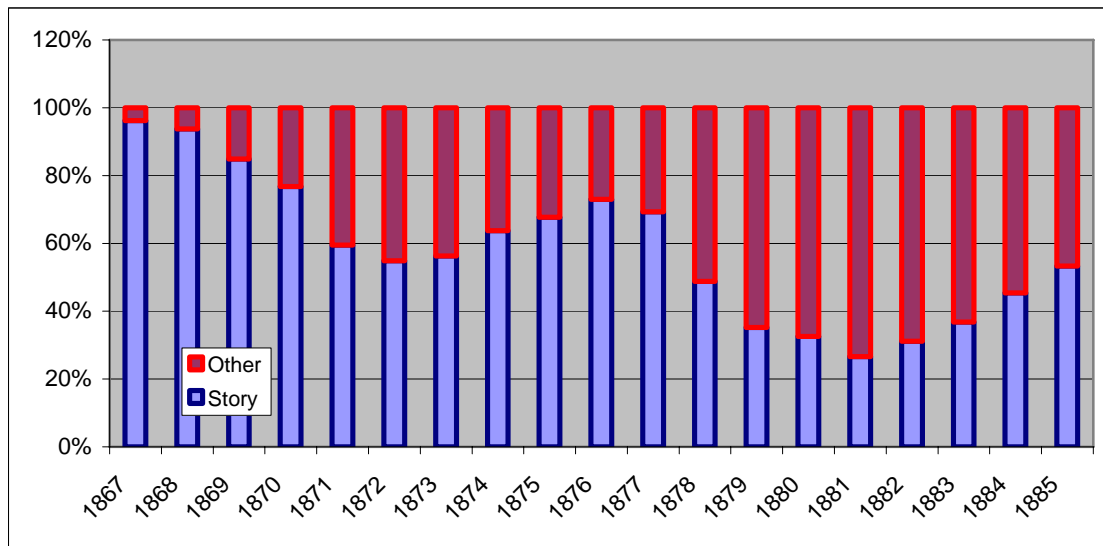
**FIGURE 1  
TONS BY PERCENTAGES BY COUNTY, 1867-1885**



**FIGURE 3  
TONS, STATE & STORY COUNTY, 1867-1885**



**FIGURE 4  
PERCENTAGE OF TONS IN STORY & OTHER COUNTIES**



Tonnage of ore extracted indicated the size of the mineral field but did indicate the quality of the ore. The value of ore per ton was recorded in the company's ledgers, in the assessor's ledgers and in the mint's ledgers. Indeed the tax collected by various agencies was levied in terms of value per ton.<sup>8</sup> The more gold and silver to be extracted from a ton of ore the more value that ton had. The range was huge, from a hundred dollars or more to a few dollars per ton. If the ore body was simply "streaked" with gold and silver, then it was worth far less per ton. When Figure 5 and Figure 7 are compared, the difference is immediately apparent. Tonnage remains at 800,000 or above per year from 1872 through 1878, but value climbs from \$25,000,000 to \$45,000,000 per year in the same period. What accounts for the upswing in value as well as tonnage in the middle 1870s was the discovery, primarily under Virginia City, of ore bodies that were measured in hundreds of cubic feet and were packed with gold and silver. Once these bodies were extracted and no others like them were found, the Comstock bonanza came to an end. Figure 8 is based on an average yield per ton for all Nevada districts. From 1875 through 1878 yield per ton exceeded \$40. For the remaining years it fluctuated between \$15 and \$40 per ton. Between 1866 and 1885 the nearly 12 million tons equaled about \$400 million for an average of just under \$20 million per year. Nevada's production curve clearly shows the role played by rising and falling values per ton.

It is important to recall that these were the values reported by the companies based on an inflated formula of the worth of silver. From 1873 to 1878 silver could not be coined. Most of the silver ore presented to the mint was returned as silver bullion and then exported. For accounting purposes, however, it was entered into the company

<sup>8</sup> The law contains a complicated formula that will be discussed in the chapters ahead. For the text of the law, see M. S. Bonnifield and T. W. Healy, compilers, *The Compiled Laws of the State of Nevada Embracing Statutes of 1861 to 1873, Inclusive*, 2 vols (Carson City, Charles A. V. Putnam, 1873), Chapter C, Section 3245, Section 1.

accounts at \$1.2929 per ounce. That was about 25 percent more than it was worth on the open market. Paradoxically the abundant Comstock discoveries had driven silver prices below \$1.00 per ounce and as low as 89 cents per ounce after several decades of fluctuating narrowly between 1 dollar and 1 dollar and 5 cents. Grant Smith in his well-regarded history of the Comstock discounted the value of silver from the standard \$1.2929 by more than 11 percent to about \$1.14 per ounce so that his total values were less than those reported by the companies and the Controller. Although the value of the ore in the coin could differ from the value of the ore on the market, Smith's discount was still 10 to 15 percent above the market value in any given year.<sup>9</sup> Still for this analysis either the reported or the discounted figures serve my purposes, that is, to evaluate the trend over the two decades. If we focus on the 15 years from 1870 to 1885, we can easily observe that in the last year ore production in both Nevada and Story County had fallen below what it was in the initial year. If we accept 1877-1878 as the turning point, we can calculate that ore output rose by 14 percent per year from 1870 through 1877 across Nevada and by 19 percent per year in Story County. The decline from 1878 through 1885 was even greater for each component: 19 percent for Nevada and 22 percent for Story.<sup>10</sup> Such rates in either direction were unsustainable. But the magnitude, especially on the upside, suggest why so much euphoria existed among public officials and private investors. Ore bonanzas had a way of inspiring hyperbole. Even the famous nineteenth-century German engineer, Baron von Richtenhofen, in a report written about the Comstock in the mid-1860s, certainly bolstered that euphoria. Even though he was careful to dampen enthusiasm about the continuing discovery of very rich ore bodies, like those near the surface of the Comstock, he did conclude that "the amount of nearly fifty million dollars which had been extracted from the Comstock lode is but a small proportion of the amount of silver awaiting future extraction, in the virgin from the lowest levels explored down to indefinite depths...."<sup>11</sup> The State Mineralogist reprinted a summary of Richtenhofen's study in his 1875 report to the State Legislature at the beginning of the Lode's biggest bonanza, and two years later, well into the bonanza, he told the next legislative session that "the supply of ore to be obtained from the Comstock lode is almost inexhaustible. Never before were there more encouraging prospects for the future. Never before was there more confidence felt in the permanency of the mines...."<sup>12</sup> Within a year the bonanza peaked and over the next seven years it vanished. The decline was swift, like air escaping a balloon, and while Nevada and even Story County would enjoy some minor bonanzas over the next 100 years (a topic for another essay), the bonanza of the 1870s remained unique and the subsequent history of the Comstock Lode was mainly filled with *borrascas*.

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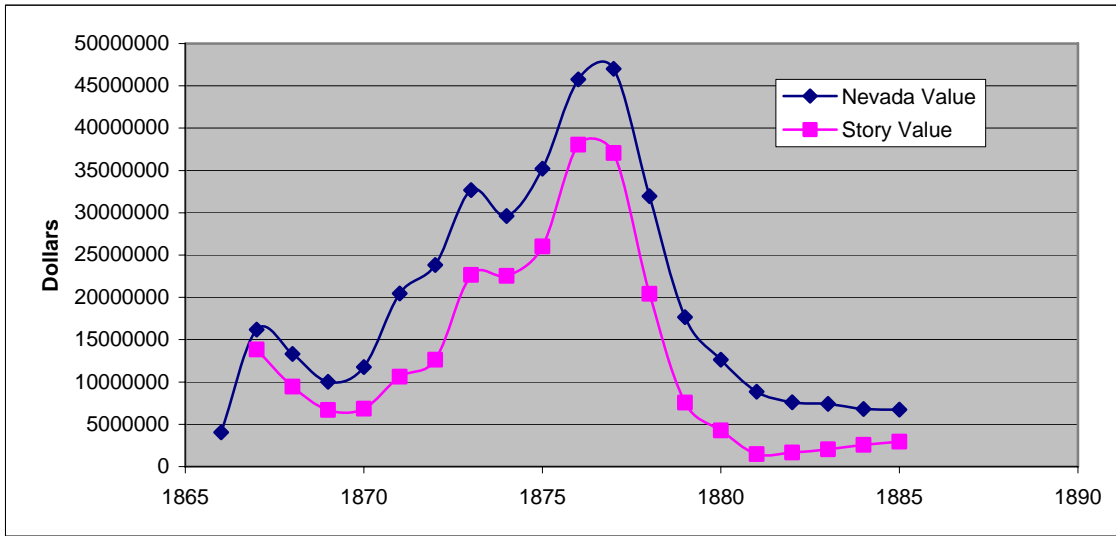
<sup>9</sup> Market prices reported in Laughlin, *The History Bimetallism in the United States*, 297. Smith's recalculations appear in *The History of the Comstock, 1850-1997*, (Reno, NV: Nevada Bureau of Mines and Geology with University of Nevada Press, 1946/1998), 260-261. In time, as the market value of silver declined, the ledgers of Virginia and California reduced the standard formula to about \$1.21 per ounce. Of course, that was still considerably above the market value.

<sup>10</sup> These rates were calculated by a simple linear regression. R<sup>2</sup>-values were .69 to .83.

<sup>11</sup> "Biennial Report of the State Mineralogist for the State of Nevada in the Years of 1873 and 1874," in *Appendix to Journals of Senate and Assembly*, 7<sup>th</sup> Legislative Session, 1875, 91-101, quote from 101.

<sup>12</sup> "Biennial Report of the State Mineralogist for the State of Nevada in the Years of 1873 and 1874" in *Appendix to Journals of Senate and Assembly*, 8<sup>th</sup> Legislative Session, 1877, 120.

**FIGURE 5  
ORE VALUE, STATE & STORY COUNTY, 1866-1885**



**FIGURE 6  
NEVADA AVERAGE VALUE PER TON, 1867-1885**

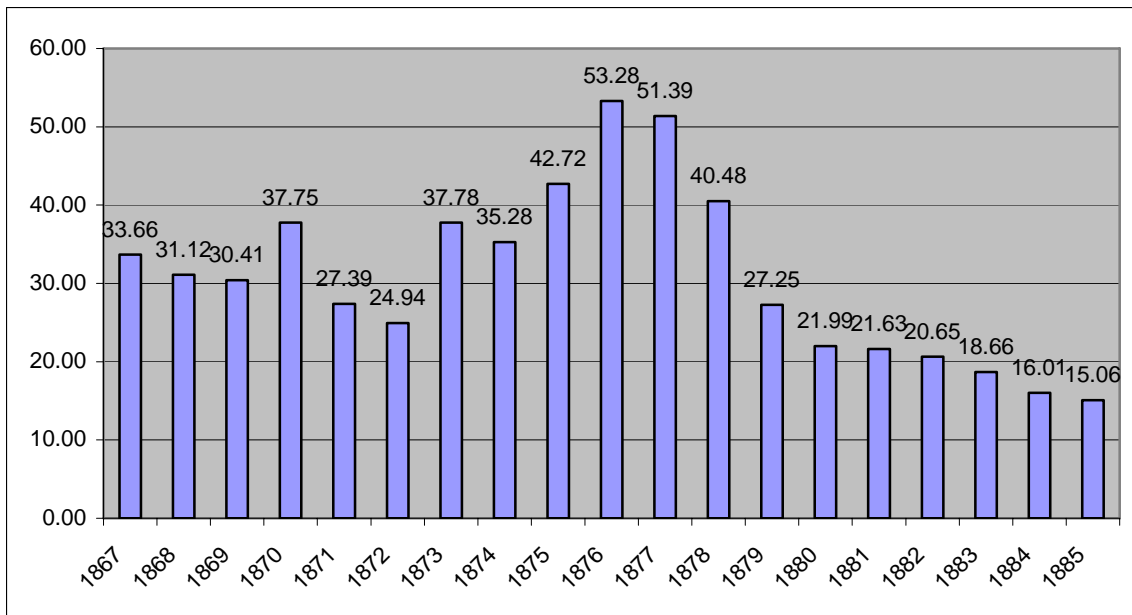


Figure 7 reveals unmistakably that Story County’s production curve began to decline one year ahead of the Nevada’s production curve. Story County peaked in 1876 at \$38.0 million while Nevada peaked the following year at \$47 million. But from 1876 to 1877 Story’s decline was a modest 2.6 percent. This did not set off any alarms in part because in several previous years production had surged 55.2 percent (1871), 79.4 percent (1873) and 46.2 percent (1876). Overriding any serious concern for the Comstock was the fact that the State as a whole had posted a rise in output of 2.7 between 1876 and 1877. But the small decrease in 1877 presaged the end of the boom. Those rich strikes

from 1875 to 1877 were not duplicated even as companies sunk deeper shafts and cut longer tunnels. From 1777 to 1881 output in Story plummeted: 44.9, 63.2, 43.4 and 65.7 percent respectively. For the next four years (1881-1885) mining in Story showed small gains, but they hardly signaled a full-scale recovery. The value of ore fell from \$38.0 million in 1876 to \$3.0 in 1885, even after four years of rising output. Nevada's premier mining center was merely a shadow of its mid-1870s self. And in time the ore curve for Nevada followed Story's path: from \$47.0 million to \$6.8 million. As Story County slid from 1876 to 1881, other Nevada counties recorded notable advances in ore output in percentage terms. In absolute terms, however, they could not compensate for what was lost in Story and lift Nevada mining from depression into prosperity again.<sup>13</sup>

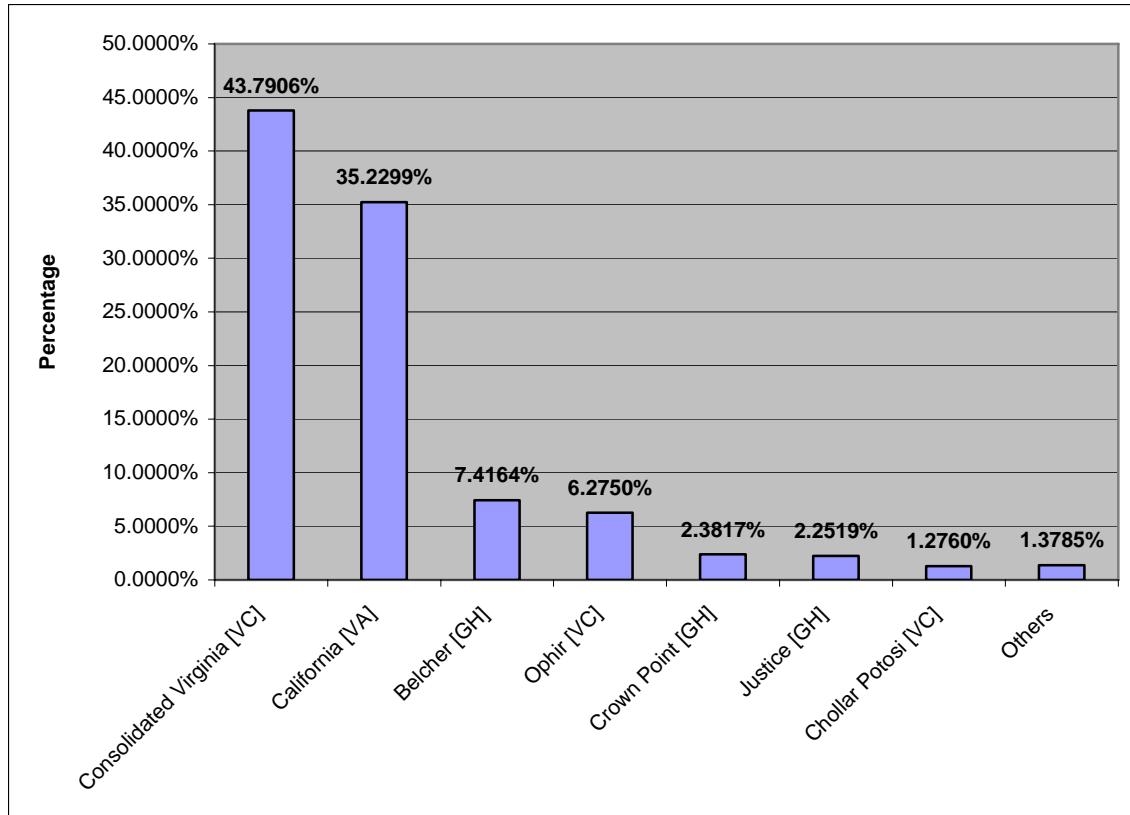
The fruits of the bonanza along the Comstock were not shared by all the mining and refining companies. Through mining-assessment documents we can refine the Comstock database to show how much each company reported annually from 1875 to 1885 over and above what was reported to stockholders or publicized by speculators. For now, let me focus on a single year, 1876, when the Comstock produced ore worth just under \$40 million. About two-dozen firms were recorded as paying assessments on ore from the mines and tailings. The two principal mining districts in Story County were Virginia City proper and Gold Hill, just south of the county seat. The biggest producers of ore were in the heart of the city. An half dozen shafts for removing the ore were located between D and H Streets. The total reported ore, as certified by the County Assessor, was \$38,038,240.80. This number turns out to be very close to the figure, \$38,038,145.76, reported by the State Controller in the Legislative Reports in the 1877 session. More than 79 percent of the ore was registered by two Virginia City companies, Consolidated Virginia and California, which were the principal mining properties of a business conglomerate known as the Firm, under the control of John Mackey, James Fair, William O'Brien and J. D. Flood. In addition to their mining properties this quartet had invested in milling, logging and other local businesses that gave them virtual control over the Comstock and the County's economy for a decade at least. Some referred to them as the "owners" of the Comstock. The Firm certainly made money from mining, and its mines were among the few that paid dividends instead of imposing assessments. Accounting for more than \$30 million of the \$38 million recorded by the County Assessor the Firm spent under \$10 million for extracting, transporting and refining the ore plus taxes collected by the County and State. Other costs, operational and non-operational, and a more precise return on investment can be teased from the company's extensive records. These mines made money because their yields of ore per ton were about \$110. No other company even approached these yields. Even more telling was the fact that the Firm accounted for 65 percent of the gold and silver reported in 1876. The Firm obviously had the richest ore bodies and may well have had the most efficient and profitable operations in Nevada or along the Comstock. In light of these observations, as remarkable as 1876 was, it has historical significance not only because of all the

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<sup>13</sup> County figures from various legislative reports compiled for each Biennial Legislative Session. The calculations are by the author.

triumphant numbers that can be cited but more so because it was the best and last year of the boom.<sup>14</sup>

**FIGURE 7**  
**PERCENTAGE OF ORE BY COMSTOCK COMPANIES, 1876**



The western mining boom in the second half of the nineteenth century caught the attention of the American public and suffused the American imagination. Not only among those who went west in search of fame and fortune, but among those who dreamed about fame and fortune. Perhaps given the level of government corruption and economic discontent in the wake of the Civil War another “gold rush” offered a welcome diversion. For Nevada, however, the Comstock was more than a diversion. Mining was the economic backbone of the new state that was wrestling with how to finance, maintain and expand the public infrastructure. But mining and the Comstock were virtually synonymous. Of the \$400 million worth of ore recorded between 1865 and 1885 probably 60 percent came from mines along the Comstock. Based on existing state and county mining taxes this yielded several million dollars for the public coffers. More to the point,

<sup>14</sup> Specifically for Story County in 1876 some of the data were drawn directly from the assessment ledgers in the vault of the Story County Assessor’s Office and the rest from the microfilm copies of the assessment ledgers on file in Special Collections, University of Nevada, Reno, Library under The County Microfilm Project, Story County, ST66. In addition the Nevada State Bureau of Mines published “Nevada’s Metal and Mineral Production (1859-1940, Inclusive)” in a 1943 issue of the *University of Nevada Bulletin*. The compilers, Bertrand Couch and Jay Carpenter, used various sources including the Controller’s Reports to assemble these series for each county.

however, almost half of the \$400 million was extracted during a few years of the middle 1870s. While dozens of mining companies operated along and in the vicinity of the Comstock, a handful, mainly located under Virginia City, pushed output to the mid-decade's unprecedented levels. When they exhausted their diggings, they reduced or terminated their operations, and more importantly they were not or perhaps more accurately could not be replaced. Shafts were pushed deeper and tunnels further but without success. Comstock mining and by extension Nevada mining had a spectacular run that did not and, as Spanish-American colonial mining had proven time and again, could not continue. The buoyant outlook of the first half of the 1870s turned into bitter accusations against speculators, bankers and investors, always described as outsiders, had drained Nevada of its natural wealth for their own selfish ventures elsewhere. Seldom in New World mining were the camps or their localities the beneficiaries of the wealthy that they produced.

The Comstock era "officially" began in the spring of 1859. In the upper region of the Gold Cañon (where Gold Hill would soon be founded) placer miners dug into the top of the vein that would constitute the southern branch of the Comstock Lode, and some weeks later a mile north at the "Ophir Diggings" where the future Virginia City would be founded another group of placer miners dug into the same vein. Much controversy surrounds who deserves the credit for discovering or locating the Lode and when that occurred. For nearly a decade after 1850 prospectors for gold had worked the streams and outcroppings between the Carson River (somewhat beyond the Lode's southern boundary) and the Ophir Diggings. The area was streaked with veins of gold. While working these veins some prospectors might have actually tapped into the Comstock Lode without knowing that they had done so. In any event working these veins did not lead to any rich deposits until 1859. Even the Gold Hill discoveries, in the words of Grant Smith, "created little excitement".<sup>15</sup> The difference, it appears, was the discovery of silver with the gold on the northern end of the Comstock Lode. In the course of constructing a trench 6 to 12 inches deep to reach the gold the claimants had to discard heavy blue sand. Placer miners were familiar with black sand but not blue sand. A few weeks after the initial discoveries assays from Ophir and its companions, Mexican and Central, showed that the blue sand was rich in silver. The effect of this combination of gold and silver was to push the yields per ton of ore from tens of dollars to hundreds of dollars. As the news of the Ophir assays spread the Comstock experienced its first real "rush". Although numbers are hard to verify, thousands, mainly from California, were alleged to have joined the so-called Washoe rush. Apparently few stayed. The placer miners complained that there was no "ground worth having" and the quartz miners complained that the best mines were "already located".<sup>16</sup> Those who stayed had to endure a harsh winter with few amenities. Despite the complaints and hardships, however, thousands of claims were staked in an area of no more than 75 to 100 square miles. It would be an exaggeration to say that every square inch of the Comstock and the region surrounding it was claimed, and yet the truth was that any land with even the slightest

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<sup>15</sup> Grant H. Smith, *The History of the Comstock Lode 1850-1997* [with new material by Joseph V. Tingley] (Reno & Las Vegas: Nevada Bureau of Mines and Geology with University of Nevada Press, 1998), 6.

<sup>16</sup> Smith, *The Comstock Lode*, 19.

evidence of vein matter was staked.<sup>17</sup> After a hiatus during the winter 1859-1860 the rush resumed in the summer 1860 as many thousands more, again mainly Californians, showed up. How many stayed or departed is a matter of speculation, although the 1860 census counted over 3,000 in Virginia City and the environs.<sup>18</sup> The Comstock was for real even if the vast majority of the claims proved to be barren.

From the earliest years Nevada mining was closely linked to California. In the first place, as the home of the first western mining boom, California had a pool of experienced miners who began to see more opportunities in Nevada than California. What they had learned about mining in California, however, was barely applicable in Nevada. In the California gold fields miners depended on placer mining. In ancient times “placers” referred to both surface and underground deposits, but in the United States they were defined legally as alluvial deposits of sand, gravel, clay and other materials on the surface and in or under the river beds that could be dredged and washed to flush out valuable minerals like gold. California was not without underground or lode mining. In the Alleghany Mining District, for example, 18 tunnel mines were said to be operating profitably in 1858. The Rainbow Mine was apparently the first to find a gold vein below the lava cap. According to a 1932 report from the United States Interior Department the “favorable opportunities for discoveries beneath the lava were offered by tunnels that crosscut the upper part of the bedrock in order to reach the gravel channels.” At Rainbow the “vein was cut in the gravel tunnel 2,000 feet from the portal, and an incline was sunk on the vein”. Rich ores were harvested until the mine was flooded soon after the discovery. The mine was marginally operative until the 1880s when some new discoveries were made. In the same report the authors remarked that lode mining “proceeded in a rather desultory fashion.” They concluded that this was the result of the way in which the ore deposits were arranged. “A shoot of enormously rich high-grade ore would occasionally be encountered” and the owners instead of using their proceeds to search for new “shoots” simply cashed out and moved on. Only a few mines stayed in business for the long haul.<sup>19</sup> For Californians with some experience in underground mining, however, Nevada posed formidable challenges. Whatever mining knowledge the newcomers brought with them from California or other localities, they soon learned that adaptation and innovation became the touchstone for success in mining on the Comstock. The history of the Comstock was not only about mining rich deposits of gold and silver but also about introducing and developing new technologies that allowed miners to reach those ores.

Shortly after the initial Comstock discoveries Nevada became a laboratory for scientists – geologists, chemists and engineers – and for cartographers who were in demand to describe and map the mineral phenomenon. Visitors included Americans and

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<sup>17</sup> Smith declared that “First and last over 16,000 claims located in the Comstock region.” He did not provide a source and did not explain if it covered just the first year of the Comstock or its entire history. *The Comstock Lode*, 19-20.

<sup>18</sup> Roland James, *The Roar and the Silence, A History of Virginia City and the Comstock Lode* (Reno & Las Vegas, NV: University of Nevada Press, 1998), 34-35.

<sup>19</sup> Henry G. Ferguson and Roger W. Gannett, *Gold Quartz Veins of the Alleghany District California* (Washington, DC: United States Department of Interior, Geological Survey, Professional Paper 172, 1932), 3-5, downloaded from [www.origsix.com](http://www.origsix.com), web site for Original Sixteen to One Mine, Inc.

Europeans whose reports and treatises on Comstock geology were published or summarized in local and regional newspapers and journals. Under authorization of the United States Geological Service several surveys produced splendidly rendered maps, charts and tables for the western latitudes in general and the Comstock Lode in particular.<sup>20</sup> The Comstock Lode was simply one of “four quartz-dominated vein systems. It was the longest and richest of the four. The other three were the Silver City Lode, which connected to the southern end of the Comstock Lode, and the Occidental and Flowery Lodes to the east of the Comstock. All of these lodes were located “in or near normal faults”, e.g. fractures in the earth’s crust that occurred during periods of dynamic geological activities. Along these fractures, as a result of the shift in underlying rock formations, spaces opened up where mineralization took place. The dominant minerals found in these faults (as well as in cross-faults) were, of course, gold (Au) and silver (Ag).<sup>21</sup> The Comstock riches were virtually exhausted within a quarter of a century, but mining continued to be an important economic engine during the rest of the nineteenth century and well into the twentieth century. Today Nevada is the largest producer of gold and silver in the nation, and its mineral-resource production (including oil and gas) contributes between 2 and 3 percent to the state’s gross domestic product.<sup>22</sup> Equally important from historical perspective is that the continuing interest in the state’s mining sector has yielded new maps and surveys that have significantly added to the knowledge base of the geological and lithological conditions at the time of the most intense Comstock activity. The history of the formation of the Comstock is much better known now than it was more than a century ago. Whatever the state of science during the heyday of the Comstock, the miners themselves through trial and error eventually figured out enough about the Comstock to do their work. That had to happen because there was virtually no prior mining experience in the country from which to draw. Lode mining in Mexico and South America had some features in common with Comstock mining, and that knowledge found its way into the lore and the science that informed the local mining community. But the initial and even the subsequent encounters with the Comstock’s physical world continually challenged Comstock miners to review and revise their techniques for dealing with an ever-expanding underground network.

It is risky for one like me with virtually no knowledge of the science of geology to try to describe the physical features of the Comstock Lode. Some description is necessary, however, because the formation of the Comstock and the presence of its ores had an impact on how the industry developed. As noted above, Californians in particular soon realized that their lode-mining experiences would play but a minor role in opening up the Comstock. Many were unfamiliar with the igneous rock which surrounded the

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<sup>20</sup> See George F. Becker, *Atlas to Accompany the Monograph on the Geology of the Comstock Lode and the Washoe District* (Washington, DC: Department of the Interior, 1882).

<sup>21</sup> See Kai Yang, Jonathan F. Huntington and Joseph W. Boardman, “Mapping the Comstock Epithermal Mineralization System, Nevada, Using Simulated ARIES-I Hyperspectral Data,” [www.gisdevelopment.et/aars/acrs/1999/ts10](http://www.gisdevelopment.et/aars/acrs/1999/ts10), 2, and D. M. Hudson, “Summary of the Geology of the Comstock District, Nevada,” in J. L. Johnson, ed., *Bulk Mineral Precious Metal Deposits of the Western United States. Guidebook for Field Trips* (Geological Society of Nevada, 1987), 413-418; Hudson also available at [www.seismo.unr.edu/](http://www.seismo.unr.edu/).

<sup>22</sup> Various publications and statistics can be accessed on Web Site of Nevada Commission on Mineral Resources, Division of Minerals, at [www.minerals.state.nv.us](http://www.minerals.state.nv.us).

Lode and through which the tunnels or shafts had to be cut in order to gain access to the ore itself. Igneous rocks are “fire-formed” rocks consisting of grains and crystals of varying shapes and densities. They form “when hot, molten rock (magma) crystallizes and solidifies. The melt originates deep within the Earth near active plate boundaries or hot spots, then rises toward the surface.” The area that generates the magma is assumed to be the asthenosphere, which is the top layer of the upper mantle. The upper and lower mantles combined are about 1,800 miles thick and make up about 83 percent of the volume of the earth. Above the mantles is the crust (about 1 percent) and below the mantle is the core (about 16 percent). Almost all the rocks that appear on the surface of the earth or are mined from beneath the surface of the crust can be traced to the solidification of molten magma because they share its chemical and mineral properties. From the surface through the crust (the ocean crust is about 1-2 miles thick and the continental crust from 12 to 40 miles thick) into the upper part of the asthenosphere, a distance of about 60 miles, exists the lithosphere. This region can be identified with earthquakes, volcanoes, uplifts that form mountains, continental drifts and tectonic plates. Lode mining occurs in the crust of the lithosphere and involves igneous rocks born out of the movement of magma (temperatures of 1,100 to 2,400 degrees Fahrenheit) from the asthenosphere or the bottom of the lithosphere through the crust and onto the surface. These are the rocks that contained the gold and silver of the Comstock.<sup>23</sup> The heat of the magma makes it less dense than the rocks around or above it and causes it to wend its way toward the surface. The movement of the magma can remake the rock formations and chemical properties of the lithosphere.

Generally speaking two flavors of igneous rocks were left in the wake of the magma bursts: intrusive (also known as plutonic) and extrusive (volcanic). Intrusive refers to a rock formation from magna “trapped deep inside the Earth.” Such molten matter because of its high temperatures naturally rises toward the surface but in fact remains “trapped below” the surface where it cools slowly and the “individual mineral grains” having a long time to develop turn into large rocks with a “course-grained texture.” Extrusive, as the word implies, refers to magna that “cools outside of, or very near the Earth’s surface.” When the magna erupts through the surface of the Earth and cools quickly into what is popularly known as lava, the result is a rock of fine-grained (or glassy) texture. Plutonic and volcanic igneous rock activity occurred “intermittently and repeatedly from earliest geologic history to within the last thousand years” according to Jonathan Price, a Nevada geologist. This activity began with the spreading of the sea floor hundreds if not millions of years ago, and it was further elaborated through “collisions of ancient and modern plates” along with “hot spots in the Earth’s mantle and perhaps outer crops....” The majority of Nevada’s mineral deposits have some association with these activities. Price writes that some “metals came from the magmas themselves” and some from magma heat that caused hot water to circulate and deposit

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<sup>23</sup> Descriptions of igneous rock formations can be found on scores of web sites devoted to rocks and minerals. See [www.volcanoes.usgs.gov/Products/Pglossary/VolRocks.html](http://www.volcanoes.usgs.gov/Products/Pglossary/VolRocks.html), web sites managed by the United States Geologic Service and United States National Park Service, specifically the joint USGS/NPS website. See also [www.physicalgeography.net/fundamentals](http://www.physicalgeography.net/fundamentals), Fundamentals of Physical Geography, Chapter 10 Introduction to the Lithosphere, (a) The Rock Cycle (h) Structure of the Earth, and [www.geology.csupomona.edu](http://www.geology.csupomona.edu), Igneous Rock Identification, Nature’s Fiery Cauldron by David Jersey and Donald Tarman.

minerals in the veins and the fractured rocks. Some “spectacular mineral specimens occur[red] in ore deposits that formed when magmas intruded and metamorphosed sedimentary rocks.”<sup>24</sup>

Whether a rock is “fine-grained volcanic” or “course-grained plutonic” is simply the starting point for a more detailed classification systems of a region’s geologic formation. The earliest surveys by George Becker and the United States Geological Service listed more than a dozen different rock formations. On a large map entitled “Geologic Map of the Washoe District” and on an insert entitled “Geologic Map of Virginia, Nev. and Immediate Vicinity” (between 119° and 120° longitude and 39° and 40° latitude) Becker and his team took hundreds of samples from which they identified up to 14 different rock formations. The Lode itself (between two and three miles long, north to south) was described simply as “quartz” or “quartz vein”. Quartz is the most abundant mineral on the face of the earth and is an important constituent of igneous rocks (as well as in metamorphic and sedimentary rocks). Rocks are fundamentally silica, combinations of silicon and oxygen (not unlike glass), and quartz is crystallized silica. In terms of the way in which igneous rocks are classified, quartz is a major component of plutonic or intrusive rocks known as granodiorite and granite and of volcanic or extrusive rocks known as dacite and rhyolite. From 5 to 20 percent of granodiorite and dacite can be quartz and from 20 to 35 percent of granite and rhyolite can be quartz. Other crystallized minerals in these rock formations include feldspars (with calcium, sodium and potassium among others) and hornblende and biotite (iron and magnesium). Further down the classification scale intrusive rocks gabbro and diorite and extrusive rocks basalt and andesite have little or no quartz. Among the dozens of silicon-based minerals quartz has a ranking of 7 on the hardness scale, one of the highest. Feldspars, which could make up 20 to 60 percent of intrusives like granodiorite and granite and extrusives like dacite and rhyolite, comes in at 5 to 6 on the scale.<sup>25</sup> Quartz, of course, did not exist independent of plutonic or volcanic rocks. Some rock specialists consider diorite as a quartz-bearing plutonic rock. In fact diorite and its companion volcanic rock andesite have little quartz, perhaps up to 5 percent. Granodiorite rather than diorite is technically the correct name, but diorite, it appears, continues to be used. When Becker made his survey and prepared his atlas, he seldom if ever used the term granodiorite. I best leave it to the geologists and other specialists to sort how and when these terms should be employed. What I can propose by way of an elementary explanation is that diorite and andesite were the predominant rocks in the immediate vicinity of the Comstock Lode. The rock formation on the Mt Davidson (or western) side of the Lode was diorite and across the Lode on the eastern side was andesite. As a general rule volcanic rocks such as andesite could be 50 percent crystalline while plutonic rocks like granodiorite could reach 100 percent crystalline.<sup>26</sup> If any of these rock formations but in particular granodiorite (or diorite) and andesite had not been altered (or had not morphed) over time, they would appear harder to mine than if they had undergone some modification. Some and perhaps a substantial

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<sup>24</sup> Jonathan G. Price, “Geology of Nevada,” in S. B. Castor, K. G. Papke and R. O. Meeuwig, eds., *Betting on Industrial Minerals, Proceedings of the 39<sup>th</sup> Forum on Geology of Industrial Minerals, May 19-21, 2003* (Sparks, NV: Nevada Bureau of Mines and Geology Special Publication, 33), 5.

<sup>25</sup> See [www.theimage.com/mineral/class.htm](http://www.theimage.com/mineral/class.htm) for information on silicates and other minerals.

<sup>26</sup> See [volcanoes.usgs.gov/Products/Pglossary/VolRocks.html](http://volcanoes.usgs.gov/Products/Pglossary/VolRocks.html).

portion of the Comstock had been altered. Indeed Becker used classifications, such as metamorphic diorite, to suggest such modifications. Some Comstock quartz was found in a crushed or sugary form as a result of geologic changes, and the miners soon learned that sugar quartz was easier to mine than the unaltered quartz.<sup>27</sup> That some rock along and around the Lode had been softened up through the metamorphosis of the rock itself allowed for speedier construction of shafts and drifts than might have been the case with unaltered rock.

Mastering rock formations and vein structures could lead miners to mineral-bearing ores, but what was a mineral-bearing ore? After cutting through various materials such as rocks, clay, quartz, porphyry, etc. how did they know that had reached the so-called ores from which gold (Au) and silver (Ag) (and other minerals) could actually be extracted? Gold and silver are themselves born out of the activity and movement of the magma. As the magma began to cool and solidify, it released water and steam along with some volatile elements. Water and steam have high enough pressure and temperature to make fissures in the rock through which the magma is flowing. The hydrothermal solutions that flow into the cracks and crevices will also begin to cool and solidify and form quartz rocks or quartz veins. These solutions may also contain molecules of gold and silver that will become attached to the quartz. In their pure, native form gold and silver along with copper, lead, aluminum and mercury belong to the “Gold Group” because they have similar chemical properties and appear in the same column on the Periodic Table. Gold can be alloyed with silver, as was the case on the Comstock. If gold and silver occurred as “native” ores, that is, not in combination with other minerals, they could be identified by color and appearance. Gold occurred that way far more often than silver. Silver seldom occurred in a natural form and almost always combined with gold, copper, lead and zinc among the major minerals but also with 50 or more other lesser minerals. Thus one can picture a crew of miners cutting through rock, removing clay or porphyry and finally reaching vein matter that appears to contain recognizable minerals like silver. (They could also have followed vein matter toward what they hoped would be a sizeable deposit.) Historically speaking, even though silver came in many variations, galena (PbS), a lead sulphide that contained more lead than silver, was one of the best known of the silver-bearing ores. But silver sulfides such as argentite and acanthite also could yield the mineral silver. The Comstock had a much greater concentration of acanthite/argentite (Ag<sub>2</sub>S), a class of silver sulfides, than galena.<sup>28</sup> Such ores also were found in the major colonial Mexican camps and perhaps in the Andes as well. And of course what made a huge difference on the Comstock was that the sulfides enclosed by rocks and other materials featured both gold and silver, a condition that would not describe the ores of Zacatecas or Guanajuato in Mexico nor the ores of Potosí in Bolivia. Although the silver extracted from the Comstock was voluminous and rich, had it been the only mineral the Comstock would still have qualified as a mining bonanza but with lower overall value since the presence of gold (40 percent) raised the value of a ton of ore considerably. The rock and its related components in particular the quartz might be said

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<sup>27</sup> Communications with geologists at UNR.

<sup>28</sup> In the *Quarterly Newsletter of Nevada Bureau of Mines and Geology* the statement occurs: “... the substantial amount of silver sulfide (Ag<sub>2</sub>S, the mineral acanthite) which was present in the Comstock ores...” (Winter 1992) on NBMG website: <http://www.nbm.unr.edu>.

to have surrounded gold and silver ores that once extracted had to be milled to be separated. Not necessarily a common occurrence for silver mining in the New World the gold and silver combination gave the Comstock a celebrity status among the big western mining bonanzas.<sup>29</sup>

In his highly readable *The History of the Comstock Lode* Grant Smith briefly described some of the formidable challenges faced by Comstock miners, especially the early Californians, in building an underground system to reach and extract the ores. In addition to familiarizing themselves with the igneous rock formations, they had to learn how to read the veins once they were underground. In California having located the veins miners could extract the ores more or less by following normally narrow veins until they petered out. The Comstock was riddled with metal-bearing veins, most of which were largely worthless. Comstock gold and silver occurred in “large thick bodies” scattered across the Lode at various depths. They could begin a foot or two wide, grow to a thickness of 50 or 100 feet and then just disappear. As a result dozens of shafts were dropped and hundreds of tunnels were dug to try to intercept those ores bodies along and in the vicinity of the Comstock Lode. In carving out these vast underground networks, miners first and foremost had to figure out how to keep them from collapsing. Using the rock itself (common in Spanish-American mines) or wooden posts and beams to shore up the tunnels proved to be unreliable. The expanse of work areas around ore deposits required more in support than the conventional methods provided. In addition the walls of the shafts and tunnels were simply not strong or solid enough to bear the weight of the ground surrounding them. They consisted of altered or fractured rock. Consequently the quartz rock, which contained the minerals, had a “sugary” character, “crushed and water-soaked”, as Smith described them, after millennia of hydrothermal and seismic activities. But there were even more serious problems. These underground spaces were “rendered still more unstable by the presence of clay and inclosed [sic] fragments of porphyry.” Clay walls often surrounded ore deposits, and as the rock was removed to reach the ore the clay could bear the weight above or on the sides. These clay barriers “were only a few feet in thickness as a rule, but occasionally increased to 20 or 30 feet. Beyond the clay were belts of partly decomposed porphyry and other walls of clay, with occasional parallel sheets of ore. When an opening was made [into the clay] the whole country began to swell and move unless held back by stout timbering. The expansive power of the clay almost surpasses belief”, reported Smith, at which point he quoted a passage in James Hauge’s *U. S. Explorations of the 40<sup>th</sup> Parallel* by Clarence King, who became Director of the United States Geological Survey: “[the clay] is of tough consistency, and when the air is admitted by gallery or shaft it immediately begins to swell and exert tremendous pressure, forcing itself through the interstices of rocks, bending and breaking the most carefully laid timbers and filling the mine openings with extraordinary rapidity.”<sup>30</sup> From time to time scalding water was encased in these clay formations, and when the clay was pierced or broken the water would pour through the adjoining tunnels.

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<sup>29</sup> I examine briefly the types of ores encountered in the Spanish colonial mines in Mexico and Peru in an essay soon to be published under the title of “Silver Mining Trends Colonial Latin American Mining”.

<sup>30</sup> Smith, *The Comstock Lode*, 24.

Fragmented porphyry did not make the situation any better. By definition porphyry was quartz that had undergone both slow and rapid cooling as the magma erupted toward the surface; as a consequence it had a mixture of large and small grains. It too could become sugary over time from the same forces that altered the composition of quartz. Even though miners came to realize that fragmented porphyry could be an indicator of the presence of gold and silver ores, it in combination with clay made for treacherous working conditions.

Before turning to how underground operations confronted these natural impediments I should make clear that except for the official surveys along with some expert commentaries the technical references to rock and ore formation seldom appeared in the mining companies annual reports or the superintendents' weekly reports. More often the rock was called hard or not so hard and the ore good or not so good. Terms like quartz, porphyry and clay to describe where the ores might be did appear in the weekly reports. The purpose in summarizing geological and mineral information was to try to pinpoint more precisely what the miners encountered even if the miners themselves did not appear to be concerned with the technical discussions.

The story of building an underground system had two contrasting elements. Days of arduous work with unaltered and often hardened (given the equipment) plutonics like granodiorite could then be followed by days of less arduous but more daunting work with altered porphyry amidst shifting clay and scalding water. Even shafts and tunnels cut through moderately hard rock could buckle as nearby sections of clay and porphyry shifted and collapsed. It is improbable that lode mining could have continued or expanded along the Comstock without the invention of a method of framing that could accommodate the unpredictable character of the natural elements. The Ophir Mine posed the initial challenge. Although there is some disagreement about the width or thickness of the Ophir ore body as it descended to depths of several hundred feet, the numbers still illustrate the problem. At the 50-foot level the ore body was said to be from 3 or 4 feet thick to 10 or 12 feet, and by the time the mine had followed the ledge that contained the ore 175 or 180 feet the width had grown from 40 to 50 feet or perhaps as much as 65 feet.<sup>31</sup> To prop up the crumbling walls and roofs the miners tried to strengthen the upright posts and horizontal capstones by splicing the timbers together. But they had no success with this approach. "Surrounded by riches, they were yet unable to carry them off and their mass of black sulphurets [gold and silver minerals] bade fair to become a white elephant on their hands. The Ophir Company began to wish themselves less fortunate, as their miners narrowly escaped burial day after day in their attempts to stope out the ore."<sup>32</sup>

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<sup>31</sup> Eliot Lord in *Comstock Mining and Miners* (Berkeley, CA: Howell-North, 1859, reprint of 1883 edition), 89, reported 3 to 4 feet at 50 feet and 65 feet at 187 feet while Smith in *The Comstock Lode*, 24, reported 10 to 12 feet at 50 feet and 40 to 50 feet at 180 feet. Lord's sources were the *Sacramento Union* from 12 December 1859 and the *San Francisco Evening Bulletin* 11 July 1860, and Smith's was the *San Francisco Bulletin* (probably meant to be *Evening Bulletin*) 12 April 1860. I cannot verify the accuracy of the news' reports.

<sup>32</sup> Lord, *Comstock Mining and Miners*, 89.

To the rescue came a young California miner and German-trained engineer, Philipp Deidesheimer. He was the superintendent of a quartz mine in El Dorado County, California, when William F. Babcock, a trustee of the Ophir Company, asked him to visit its Comstock property and advise on ways to improve the timbering of the interior of the mine. With some experience from “gravel and quartz” mines in California he arrived in Virginia City in the autumn of 1860 and set about to develop timbering that came to be known as the “square-set” system. It consisted of a base made from four horizontal timbers, four to six feet in length, to which were attached four corner posts, six to seven feet in height. Four more horizontal timbers were attached to the tops of the posts, and four more vertical posts were attached to the horizontal timbers. These cubes could be “extended to any required height and over any given area, forming a series of horizontal floors, built up from the bottom sets like the successive stories of a house. The spaces between the timbers were filled with waste rock or with wooden braces, forming a solid cube when ever the maximum degree of firmness was desired.”<sup>33</sup> As the miners worked their way along the Lode - in the case of the Ophir Mine descending from 50 feet to nearly 200 feet - they could adjust the cubes to account for the angle of the stope and the openness of the chamber. The “square-set” modules allowed for the weight of the rock, clay and porphyry to be spread across more than a “cap and post” approach. This helped to reduce the risk of cave-ins from the weight of the material above the working chambers and from less than sturdy walls surrounding the chambers.<sup>34</sup> Since the Ophir ore body was replicated in more than a dozen other Comstock locations that required huge cavities to be constructed in order to extract gold and silver at ever-increasing depths the “square-set” platform remained the basic format. Today Virginia City sits over a plot of ground, the underpinnings of which are not the natural elements of rock and clay but rather are Deidesheimer’s cubes.

Nearly all of the Comstock histories credit Deidesheimer was the most timely of inventions. Besides descriptions of square-sets (the above from Lord’s *Comstock Miners and Mining*) Comstock histories included wonderful illustrations of how square-sets may have looked inside the mines where the ore bodies existed. Whether these illustrations accurately portrayed the installation of square-set timbering in underground chambers, some of which were hundreds and hundreds of cubic feet in volume, cannot be determined from various company reports. A decade later in the largest mines such as Consolidated Virginia and California (to be discussed later) underground crews included bulkheaders and timberers who were responsible for the installing and maintaining these structures. Certainly Deidesheimer opened the way for companies to develop their underground assets at a time when knowledge about deep mining was minimal. But his technology did not eliminate the underground nemeses of structural overload and shifting terrain that could endanger lives and suspend operations at all levels. Over time as miners learned from experience how to refine and adapt underground timbering techniques these nemeses became more manageable and less disruptive. As will be discussed in later chapters, active companies annually committed material and personnel to rebuilding and repairing their underground works in addition to expanding those works.

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<sup>33</sup> Lord, *Comstock Mining and Miners*, 90.

<sup>34</sup> Smith, *The Comstock Lode*, 24, Dan DeQuille [William Wright], *The Big Bonanza....* (New York: Alfred Knopf, 1947), 90-91, 93, and James, *The Roar and the Silence*, 54-56.

Once the outcroppings and the shallow veins were exhausted, the Comstock's continuing operation depended on money. Few miners, whether early prospectors or later entrepreneurs, had the capital to open and expand these underground systems. Thus began a long and often rocky financial relationship between San Francisco and the Comstock. Almost from the outset to find the ores and once found to extract and refine them required large capital outlays. Without them deep mining on the Comstock would certainly have followed a different historical path. San Francisco, having grown up around the California gold rush, was uniquely situated to become the Comstock's banker. As a financial center, however, San Francisco had fallen into a minor position. Not only had many northern California's gold fields been exhausted, but because of a series of mining-stock frauds in connection with those fields the city's financial reputation had also been tarnished. The Comstock presented new and potentially lucrative opportunities for San Francisco's financial community. As word about the riches of the mines spread San Francisco investors and speculators alike began to buy mines and build refineries at a rapid pace. San Francisco money financed the expanding underground operations that saw output jump from several hundred thousand dollars per year to several million, and this helped to transform San Francisco itself into the west Coast's financial epicenter. The most direct evidence of this was the establishment of the city's stock exchange in 1863. The exchange became the vehicle for both the legitimate advancement of capital funds and the less than legitimate manipulation of stock prices. Not surprisingly the California connection, although vital, was not always welcome. The manner in which capital was raised, profits, if any, were distributed and stock was manipulated inspired much Populist rhetoric about the raping of Nevada for the benefit of the rich and powerful in San Francisco. While a mechanism was needed to underwrite the cost of deep mining, it was often criticized as serving the financial schemes of the brokers and bankers than the financial needs of the Comstock. Nevada itself had little liquid capital, and if San Francisco had not served as the Lode banker some other financial center would have. Economic benefits accrued to the region of the Comstock and to the State while the mines were being worked, but what aroused the anger of the Nevadans (nearly all transplants) was that what flowed into the region or the state in the form of wages, profits or dividends was a pittance compared to what flowed out mainly to San Francisco and the West Coast. When the Comstock bonanza ended once and for all in the 1880s there was widespread condemnation of the practice of outsiders – investors, speculators, financiers and even notable miners – reaping fortunes in Nevada and reallocating them to California. How and where such internal development could have been channeled in a nation and a region that deeply distrusted any form of public economic planning (had such planning any relevance in the first place) was never explained, and indeed historically extractive economies like early Nevada's were more often than not exporters of wealth and not investors of it. The Comstock was unique to the degree that it sired one of the grandest mining ventures ever, but it was hardly unique in how its mining economy evolved and functioned.<sup>35</sup>

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<sup>35</sup> Many books and articles were published on the financial connection between the Comstock and San Francisco. Almost without exception whether of the nineteenth-century laissez-faire or muckraking tradition they take note of the malicious and profligate actions of the San Francisco capitalist network. By far the grandest complaint was that this network of moneylenders, speculators, and investors were often

**LINKS:**

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driven to manipulate the prices of the stocks of the Comstock mining companies for personal gain rather than by sound business practices. It is almost uniformly true across the history of large-scale mining in many societies that the communities that produced the wealth realized few long-term benefits from the wealth itself. The Comstock was no exception. Among the earliest and most vividly written critiques were by George Lyman, the Progressive historian: *The Sage of the Comstock Lode* (New York: Charles Scribner's Sons, 1937) and *Ralston's Ring California Plunders the Comstock Lode* (New York: Charles Scribner's Sons, 1937).