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FLORIDA MOUNTAIN MINES
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Development and production, both from Florida Mountain and Delamar, depended upon geological conditions that varied considerably. Major operations were delayed for two decades because mineral outcrops gave very little surface indication of important veins of ore, so impecunious prospectors and small operators worked many years before they identified promising enough lodes to interest major investors. Surface outcrops had disintegrated into a clay-like ore in which fragments of rock ore were crumbled, "leaving no clear indication of the direction and thickness of the vein" that produced them. Ascertaining any accurate conception of geological structure of that kind of vein system was exceedingly difficult. Silver City had large enough stamp mills and adequate processes for working such ores, but long exploratory tunnels had to be driven before serious production could get underway.

Delamar had a series of parallel veins at intervals ranging from 20 to 80 feet. They had a decidedly flat dip of 25° to 55° averaging 38° so that two long adit tunnels, followed by twelve levels of subsequent development, were required to establish vein structure there. Long tunnels were necessary because gold and silver veins at Delamar dipped away from Jordan Creek, where tunnel and mill sites could be established. No other suitable locations were available. With more gold than silver (in value, not in weight), Delamar differed notably from Florida Mountain, where veins dipped much nearer to vertical and contained more silver value than gold.

Florida Mountain had a rhyolite flow that overlay and merged with a thick flow of basalt. These, in turn, covered a much deeper core of granite through which basalt and rhyolite had intruded in successive stages. Then a dyke and vein structure penetrated fractures that opened through lower granite, intermediate basalt, and surface rhyolite that made up Florida Mountain. Faulting in Florida Mountain was not complex, and aside from surface indications that created difficulties, its geological structure did not pose any great problem. Transverse

or oblique faults that would have made veins hard to follow were absent there.

Mineral values varied substantially in different levels of Florida Mountain veins. Ores in almost any large lode were altered at depth, often changing to sulphides. Recovery problems became serious with sulphide ores because they were not free milling. Oxide ores could be crushed in stamp mills and then amalgamated with mercury and retorted in a heating process that left gold as a residue and mercury captured for reuse. Roasting and other separating processes were tried for sulphides--sometimes successfully but often with unfavorable results. A system of Washoe pans prepared for Comstock lode properties in Nevada had proved suitable for many Silver City mines. This process worked at Delamar, where sulphides were less of a problem. Florida Mountain ores had more sulphides, requiring a more elaborate process. Vanner concentration, not needed at Delamar, was required for Florida Mountain. But those ores varied considerably in different parts of prominent veins.

Florida Mountain rhyolite lodes tended to be wider and to have more spotty ore deposits. Some upper Black Jack surface deposits had particularly rich streaks that were productive from 1865 through 1875. Work resumed there in 1889 on a four-foot vein after some modest, intermittent production by leasers. Farther down, veins adjacent to rhyolite dykes were narrow where they had to penetrate a hard basalt formation intermediate between their surface rhyolite and lower granite levels. A three-inch hanging wall seam and four one-inch footwall seams came up on either side of a rhyolite dyke, but farther along, a 2-3/4-foot thick vein-split by a soft rhyolite dyke from a vein a few inches thick--had greater values. Still farther down in an older granite formation, a ten-inch vein adjacent to a two-foot dyke was an average situation. Richer Black Jack values were noted in a deep granite segment that was located adjacent to Trade Dollar holdings. Such variations proved typical, along with changing ratios of gold to silver in granite, basaltic, or rhyolite levels of veins that penetrated all three formations.

Costs of processing wider and narrower veins, and of recovery from veins with greater gold or silver content, varied considerably. Mining costs of narrow Florida Mountain veins ran about $6 a ton higher, and milling costs also increased a little as well. Trade Dollar Silver values increased at depth, more than enough to compensate for declining gold values at lower levels. But total mining costs of deeper Trade Dollar operations got higher because granite veins there were narrower and ore had to be hoisted farther. Deep Trade Dollar granite veins had more

than enough additional richness (a condition not typical of many Idaho mines) to provide increased profits regardless of ascending costs. Mining costs for Florida Mountain sometimes went up to $10 a ton, compared with half that amount at Delamar, where veins were wider and less difficult to reach. Declining prices of silver after 1888 and especially after 1892 affected ore values greatly as work progressed, lowering profits that might be gained and reducing total quantities of available ore at a time when development was proceeding rapidly.

Early Florida Mountain production, primarily 1865 to 1875, had yielded about $1,600,000 by 1889 when major development commenced. Several hundred thousand of that amount came form early surface operations before some Black Jack and Empire State tunnels explored an upper rhyolite formation. Unlike Atlanta and some other gold-silver districts that had exceedingly refractory ores, Florida Mountain's really large-scale operations were not delayed for lack of adequate milling and recovery processes. Other factors accounted for slow development there. Timber or coal resources essential for steam power could be obtained only with excessive difficulty and expense. Local timber was exhausted, and South Mountain sources were expensive and remote. By 1884, Wyoming coal could be imported by railway to Boise Valley, but freighters who hauled coal on up to Silver City had a long, hard trip that matched costs from South Mountain. Electric power from Swan Falls eventually answered that problem after 1900, but long transmission technology was not available until about that time. Power drills--a technological innovation not available for early War Eagle Mountain operations--also facilitated efforts to drive long Florida Mountain tunnels after 1889. Development capital for such tunnels, and to sink inclines to reach ore at depth, had to be provided from outside sources.

Consolidation of claims, including the Black Jack, Trade Dollar, and intervening holdings, also was essential. Acquisition and development of lodes extending about two miles in length came as part of capital investment to make Florida Mountain operations pay dividends. Infusion of capital from Pittsburgh took prospecting for precious metals from faltering and increasingly feeble hands of hardy prospectors and transferred it to investors using new technology to push exploration to a successful climax. Idaho and Pittsburg Mining and Milling Company miners could employ power drills after 1890, and had to have power for ventilation for such underground workings as well. That way, they got by with comparatively few surface adits and raises. Within a decade, they had completed a maze of shafts, stopes, raises, winzes, and intermediate levels

that resemble nothing quite so much as typical labyrinthian underground work Agricola depicts for sixteenth-century miners, except for miniature size that modern technology could dispense with. Essentially all of this new equipment had been utilized for better capitalized Comstock operations much earlier than 1890. But Silver City miners could not profit from Comstock technology until they could demonstrate a reasonable prospect for profitable investment in low-grade Florida Mountain and Delamar ores. Until then, newer technology remained unavailable.

Profitable mining operations depend upon current ore values (which fluctuated greatly for silver, but not for gold in that era) in relation to mining and milling costs for metal recovery. Anything that reduced those costs--improved technology, better transportation, or cheaper power, for example--helped to create more ore and to increase profits that attracted investment. In most deposits, higher grade ore that could be processed efficiently and inexpensively usually was mined first. This feature characterized early War Eagle mines that greatly exceeded Florida Mountain and Delamar properties in richness, but that could not be worked after a San Francisco banking collapse in 1875 because their better values had been gouged out. Other camps such as Rocky Bar in Idaho and Goldfield in Nevada had a similar experience. But when capital, technology, transportation, and power sources became available at Silver City, low-grade veins could be mined profitably for more than two decades. In more recent years, that era of underground operations gave way to twentieth-century technology with large open pits in which heavy equipment replaced expensive timbering, a labor intensive approach that no longer could be afforded. Lodes that provided ore between 1890 and 1912 lost their value, but still lower grade deposits that attracted no interest as late as 1912 became ore-bearing resources capable of outproducing earlier properties when later twentieth-century technology was applied. New sampling and prospecting approaches revealed ore that had been considered worthless ground, while once-productive old lodes no longer contained ore at all--even if they had been left intact during earlier mining eras.

When serious, well-financed development work began on Florida Mountain in 1889, a long crosscut tunnel struck a major vein (one of several parallel ore-bearing possibilities in that era) in a barren place, so for two years, "matters looked bad." Finally a drift picked up good ore in 1891, allowing Black Jack production to continue until water problems forced operations to shut down there in 1899. Other ore bodies continued to produce, though. W. H. Dewey's 3,900-foot Blaine tunnel, driven northward

from Trade Dollar development in 1891, gave access to good ore, and Black Jack and Trade Dollar working were interconnected in a long tunnel system extending about two miles (but containing many more) from Long Gulch to Dewey, so another decade of profitable operations remained possible.

Nineteenth-century Florida Mountain and Delamar production increased dramatically after Joseph R. DeLamar began to promote low-grade Owyhee lodes in 1886. Acquiring John Wilson's interest in a Wagontown property that had been discovered more than a decade earlier, DeLamar acquired a Silver City 10-stamp mill to process Delamar ore. His $30,500 mine purchase led to modest preliminary production in 1886 and major new discoveries at Delamar, where three quartz lodes--one twenty feet wide--justified importation of another large mill there. Meanwhile, DeLamar moved his Cosmos mill from Silver City to Delamar. Up until then, costs of hauling ore from Delamar to Silver City limited production to development and testing. Serious production commenced at Delamar with a $26,000 batch (about two-thirds gold in value) in December 1889. Lack of timber and fuel restricted his operation in 1890, but his miners managed to build a 2,300-foot tramway to his mill while their other activities were curtailed. By summer, daily production increased to $3,000, so after four years of preparation, Delamar finally realized its potential. By November, J. R. DeLamar had arranged to dispose of his Owyhee property to British interests--a transaction from which he realized $463,600 in cash (after spending $500,000 to purchase interests of his original partners in January of 1890, an amount more than covered by his profits of $1,400,000) and 105,000 shares of a British company stock. Counting stock value, he received about $1,700,000 for his interest there. This proved to be a profitable British investment. One of a substantial number of sales of Idaho mines to British interests, it returned enough profit to cover all losses realized in all Idaho transactions in other camps. All other British investments in Idaho lode properties were failures.

As a result of the Florida Mountain production, Owyhee mining totals rose from $134,941 in 1888 to $571,236 in 1889. Then a combination of Delamar and Florida Mountain properties turned out $1,148,010 in 1890 and almost as much--$1,034,513 in 1891. Production continued to increase at Delamar. By 1898, $3,300,000 had come from about 160,000 ounces of gold, and $2,561,160 from 3,164,500 ounces of silver. Low silver prices robbed Delamar (as well as Florida Mountain) of metal value, and inefficient recovery of silver at Delamar (from only 19 percent to 22 percent, compared with a 70 percent to 80 percent gold

return) reduced production even more. But with a total production value of $5,861,160 by 1898, Delamar had a respectable record despite severe losses and limited silver prices. At least 100,000 tons of tailings were retained for later reworking. Better recovery processes should have provided a notable increase--about $4,000,000 in gold and $5,000,000 in silver--during that era. But Delamar miners could only resort to what technology was available.

Other prospects near Delamar proved unrewarding. A Henrietta discovery in 1875 was associated with J. W. Stoddard's original Delamar discovery that year. Intermittent work over two decades proved 150 tons of high grade ore ($100 a ton) that had to be shipped out for roasting. A group of other prospects there--Garfield, Chautauqua, Wahl, Ohio, Stoddard, Sommercamp, Clubfoot, Lepley, Golden Cycle, and Silver Vault--had a lot of work performed on them. Two Voshay tunnels--a 700-foot third level and a 1,000-foot fourth level--explored that property extensively. Aside from providing a considerable reserve of potential refractory ore that could not be worked, they attracted no notice. As unproductive properties, they excited interest but could not be mined successfully.

Once Swan Falls power became available, Florida Mountain and Delamar production difficulties were surmounted, and in a decade miners there were able to complete their era of gold and silver milling. Altogether, they provided about three-fourths of Owyhee's $40,000,000 yield prior to 1976, when open pit operations were arranged for. They demonstrated how much more could be done with large reserves of low-grade ore, compared with exceptionally rich but limited amounts of high grade War Eagle Mountain lodes. Both cases represented adaptation of resources and technology to an industrial era that could produce metal in its own time, but (with some interesting exceptions for extremely high-grade surface ores) did not fit well into another era. In particular, late nineteenth-century production from tunnels and shafts could not be duplicated under later twentieth-century economic and technological constraints. Nor could twentieth-century massive low-grade open pit operations be considered in 1890, when a low-grade Florida Mountain and Delamar development was getting underway.

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