MANHATTAN

# Silver Mining Company

OF NEVADA.

REPORT OF ADELBERG & RAYMOND.

1865

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# Silver Mining Company of Nevada.

**CAPITAL STOCK, - - - - $1,000,000,**

***In Shares of $100 Each.***

**Trustees:**

THOMAS N. DALE, - - - - NEW YORK.
E. PEET, - - - - - - - - - "
H. AUGUSTUS TAYLOR, - - - "
JOHN J. OSBORN, - - - - - "
E. REED McILVAINE, - - - - "
CHARLES V. MARTIN, - - - - BALTIMORE.

**President:**

H. AUGUSTUS TAYLOR.

**Secretary and Treasurer:**

CHARLES G. TAYLOR.

**Resident Superintendent:**

JOHN E. BOYD, AUSTIN, NEVADA

***Office of the Company—30 BROAD ST., NEW YORK.***

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# REPORT.

INTRODUCTION—COMPARISON OF VIRGINIA AND REESE RIVER.

The early traveller, whoever he may have been, who, entering the country east of the Sierra Nevada, in the latitude of Carson Lake, gave it the expressive name of the Great American Desert, no doubt supposed that he had found a barrier between the Atlantic and Pacific, more formidable than mountain-peaks or stormy seas. No matter with what giant strides the coast of the Atlantic or the Valley of the Mississippi might advance to wealth and power—no matter what imperial cities might arise along the golden shores of the Pacific; between them stretched this desolate land, of then unknown extent, apparently forsaken of Heaven, and offering only death as a reward for the enterprise of man.

The observer of to-day cannot escape the same first impression. Nothing breaks the ashen monotony of this waste. There is no form, no color, upon which the eye can rest with pleasure. The brain seeks in vain for suggestions of thought. In this horrible wilderness men have lost themselves, body and intellect at once—their minds, like their feet, wandering in circles without guide or landmark. The bones of unfortunate travellers have gradually defined the road through the desert.

But this forbidding land was to become, not a dismal barrier, but a silver bridge, between the East and West. Compensating Nature has blessed this region, to atone for its sad deprivations, with a wealth, in the measure of which the fancy of the poet can only compete with, not surpass, the statistics of the mint.

There is no known field so peculiarly fitted to the spirit of American enterprise as this Reese River country. That spirit demands positive material results, without loss of time, and without the necessity of that close discrimination and economy which is the only guide through the intricacies of business in old, long-settled countries. In a word, we ask quick and sure profits; and if they are not sure, then they must promise to be large. The energy displayed in the recent development of petroleum lands, is evidence of this. But Reese River Silver Mines can show a more encouraging record than petroleum in its palmiest days. Let the following facts suffice as proof:

The Reese River District was discovered at the close of 1862, and began to be settled and prospected in 1863. Last year there was capital invested there to the amount of $2,000,000; and the amount of bullion produced in the same year was $600,000, or 30 per cent. on the capital. This year, without the use of any additional machinery, the monthly product is $100,000. The product is limited only by the number of mills running, since every mill is supplied to its full capacity with ores. Taking into consideration the fact that *four* mills produced the above results, and that *thirteen* new and improved mills will be at work next year, we are justified in saying that five years can hardly pass before ten bars of silver will be shipped from Austin for every one that goes from Virginia City, hitherto the Ophir of the continent. Austin and its district will only begin to live when the Pacific Railroad is completed. The astounding achievements of the past two years are as nothing to the certainties of the future.

American capital, as we have said, demands that profits shall be large, if not sure. We venture to say that nowhere else can they be found so large and so sure as in the Reese River country. A man or a company, with eyes open, cannot fail here; for there are no sources of failure aside from the dishonesty of agents.

The characteristic features of the great argentiferous lodes of the Reese River District may be best comprehended by a comparison of this district with that of "Virginia," also called "Washoe."

These two regions are divided by Carson Sink, or the valley of Carson Lake, lying between the eastern slope of the Sierras and the range of hills known as Silver Hill. The two regions are subdivided into numerous "districts," technically so called; but the general names of Virginia and Reese River are justified by the total and thorough distinction, marked no less by the valley above mentioned than by radical differences of climate, topography, mineralogical features, and vein-phenomena. These causes have already produced in the population of each region a local and distinct spirit. In energy, enterprise and contempt for each other, the men of Virginia and Reese River eagerly compete. Virginia is now far ahead in material progress; but we think the chances of the future are in favor of Reese River. The impartial observer should be cautioned against accepting the opinion of either side concerning the other; for "Reese River is nowhere" to the Virginian, and the partisans of Austin assign to Washoe the same indefinite locality.

The first great distinction between them is this: The producing mines of Virginia City are all on one lode, which, in its innumerable subdivisions, extensions, continuations, feeders and what not, supplies a host of companies with names, which, if they do not mean Comstock Ledge, mean nothing. The mining field, however capriciously dismembered by multifarious ownership, is to the eye of the geologist and miner, a unit—all its phenomena being referable to one master-lode.

The numerous names of Reese River, on the other hand, signify as many distinct undivided lodes, each having characteristics of its own, while certain general features are common to them all.

Again, the ores of Virginia carry a large portion of their silver in the native state, while the silver of the Reese River ores is perfectly mineralized:—that is, it appears invariably in chemical combination with electro-negative elements, as true silver ore.

A third important difference is in the outcrops of the metalliferous veins—those of Virginia being bold and strongly marked, while those of Reese River are indistinct, blind, and unattended by irregularities of the surface. In fact, the Reese River lodes may be said to crop out several feet below the surface.

This comparison of the two regions is necessary, first, to explain how those who are only acquainted with the mines of one of them may be totally deceived in judging of the other; and secondly, to show the folly of expecting that the same indications accompany rich ore in both, and to hint at the magnitude of the task which now lies before us—namely, a description of the Reese River country, with especial reference to the property of the Manhattan Company.

### TOPOGRAPHY OF THE REESE RIVER COUNTRY.

The eastern declivity of the Sierras, on which stands Virginia City, descends, first steeply, then with imperceptible grade, to the Sink of Carson River—that is to say, from an altitude of 6,000 feet to one of perhaps 3,500 feet. From Carson Sink the country rises again eastwardly, with easy grade, to Silver Hill, the most westerly of a series of mountain ranges, parallel with each other and with the Sierras, and separated by level plains or flats of little width but great length. The widest of these plains is that of the Carson Sink already alluded to, and also called Twenty-six Mile Desert. It is the lowest of the series. Indeed, these narrow plains rise regularly in successive order eastwardly, and form, taken together, a system of terraces between Virginia City and Austin, which makes the elevation of the latter city a few hundred feet the greater of the two. The mountain ranges may be considered, then, as merely the dividing lines between many parallel terraces in which the country rises from Carson Sink. The detritus from the eruptive rocks of these ridges has formed the flats between them, and constitutes a poor, pebbly and sandy soil, on which nothing grows for miles but the dingy sage bush. Here and there small accumulations of humus occur, where some bold ledge crosses the descent of a creek. At such points will be found greater variety of growth, such as wild prune, wild gooseberry, wild rose, cotton wood, a sort of mahogany, &c. The "piño" or pine-nut tree is found on the southern slopes, where the elements of disintegrated rock are favorable to vegetation; but it only grows in groups, not densely. Such groups of pine-nut are called timber lands.

Where they are large, they furnish fuel for several years. The neighborhood of all settled places is already cleared. Want of fuel is the only serious drawback to the development of the wonderful resources of this country.

Each of the mountain ranges is a water-shed. There is no communication of water-courses between the flats; but each is in this respect a little inland world, producing and consuming its own precipitations of moisture from the atmosphere. Every rivulet and spring, as well as the principal rivers, has its own sink near by, where it plunges down and disappears, or pauses and dries up. Of these we shall speak again.

### GEOLOGY OF THE REESE RIVER COUNTRY.

The rugged conformation of the mountain ranges indicates at once their great antiquity. Primeval granite, with chloritic slates, the latter mostly altered, always broken and much tilted, are the constituent rocks. Here and there are small patches of sandstone and limestone—remnants, the lithological character of which is almost obliterated and metamorphosed beyond accurate recognition. These remnants of sedimentary rock are few and far between. In the latitude of Virginia and Austin the plutonic rocks, (granite, syenite, porphyry, &c.,) and volcanic rocks (trachyte and trachytic lava,) predominate, while north of this line the outcrops of chloritic and argillaceous slates are larger than the rest.

Among the most obvious geological features of the country are three parallel zones of volcanic rock, which run across it from east to west, cutting the ridges and valleys at right angles. From a great distance they strike the eye as yellow or light red belts, stretching, a mile wide, over the backs of the ridges. They lose themselves in the alluvium of the flats, to reappear on the opposite mountain sides in the precise line of their course. The rock of these belts is all spongy, burnt, and altered beyond recognition. It contains traces of cinnabar and large quantities of soluble sulphates and chlorides. These are the original depositories of all those salts that appear in the deep mould of the flats, where the rivulets evaporate or "sink."

The variety of contents and temperatures among the springs

of these terraces is wonderful. Highly charged with soluble salts from the volcanic rocks, the water descends to be filtered and evaporated in the sands of the flats, and leaves a residuum of common salt in one place, of carbonate of soda in a second, of borax in a third, of alum in a fourth. These are the evaporating dishes of the laboratory of the great chemist, Nature. Her retorts, too, are near by. Fissures in the rock are their necks, from which sublimations of pure sulphur are deposited. She experiments, too, with hydrocarbons, after the fashion of Venango County; and a deposit of yellow tar (on Tar Creek, a few miles south of the latitude of Austin) is the evidence of her success in the Petroleum line.

### VEIN-PHENOMENA OF THE REESE RIVER COUNTRY.

Long and careful study has enabled us to divide the argentiferous veins of this region into two great systems, distinct in age, character, and value. The first of these we denominate the Old System, because the veins cut the primary rocks only, and, therefore, cannot be geologically more recent than the Silurian Age. They have a general course N.W. and S.E., and dip from 40° to 70° to the N.E. They are disturbed by a series of faults running 15° W. of S., which must have occurred soon after the formation of the veins themselves. At all events, these faults are older than the veins of the second system, since they are cut by the latter. The Silurian veins are invariably small. They carry from the outcrop to the water-level the never-failing chloride of silver, with carbonates of copper and lead, and antimoniates of lead. Below the water-level, the metals appear in the state of sulphurets, and the veins become immensely rich in true silver ores, such as Antimonial Sulphurets of Silver, (Brittle Silver Ore, Dark Ruby Silver or Pyrargyrite, Miargyrite), Arsenical Sulphurets of Silver, (Light Ruby Silver or Proustite), Stephanite, and a great variety of Fahlerz or Copper Silver Glance, of various richness. A symmetrical arrangement of vein-matter, with interlacing combs, is characteristic of these veins.

This System is divided into two classes, of which the first carry oxidized metals even below the water-level, have a

very dark, blueish-black color, and both hanging and foot wall (granite) totally decomposed by violent vein-action, to a distance of five feet on either side.

The second class carry no oxydized metals below water-level, are light-colored, and have decomposed the country rock for two or three feet.

The veins of the second or New System are of greater size, but less antiquity than the first. They strike N. and S., dip almost 90°, and vary in width from three feet upwards. They carry as gangue massive quartz, with no internal arrangement of vein-matter, and show by the appearance of sulphurets at their very outcrops, that they are of geologically recent origin. This system also must be divided into two classes, the first of which show oxyds and sulphurets mixed often with backs of iron and manganese, and the second carry only the sulphurets of base metals even at the outcrop. The latter veins are sometimes 150 feet thick; but they cannot as a class be called rich veins.

The following resumé will present in a comprehensive view this classification:

(N. B.—It must not be supposed, that strike and dip are so uniform, as this table seems to indicate. In this respect there is considerable variation among veins, even of the same class. Indeed, if we consider the manner in which fissure veins are formed, it seems strange that there should be any parallelism at all.)

| System. | Class. | Occurring in. | Strike. | Dip. | Outcrop. | Contents. | Example. | Value |
|---|---|---|---|---|---|---|---|---|
| Old.. | I. | Granite. | N. W. & S. E., with faults. | 40° to 70° N. E. | Chloride of silver, carbonates of lead, copper, &c. Black. | Below water-level. Some oxyds and rich sulphuretted ores. Vein-matter symmetrically arranged. Country rock much decomposed. | Revenue Mine, on Lander Hill. | Very rich. |
| | II. | Granite (and Slate.) | do. | do. | do. Lighter in color than No. I. | No oxyds below water-level. Vein-matter symmetrically arranged; vein-action on country rock less violent. | Oregon Mine, on Lander Hill. | Very rich. |
| New. | III. | Slate (and Granite) | N. & S. | Varying either way a few degrees from 90°. | Massive quartz, sometimes iron or manganese back, with oxyds and sulphurets. | Sulphurets below water-level. No arrangement of vein-matter, which is massive quartz. | Many lodes of the Smoky Valley and Amador Districts. | Sometimes good. |
| | IV. | do. | do. | do. | do., with sulphurets of base metals only. | Base metals; no arrangement of vein-matter. | North of Amador District. | Doubtful. |

Several veins of the Old System carry their various antimonial and arsenical ores so pure, that the bullion produced after amalgamation is 995–997 fine. Indeed, one bar of chemically pure silver (1,000 fine), was cast in Austin, at the period of our visit, from the ores of the Midas mine. Other veins carry more copper, lead, and even zinc, in their ores; but all of this system are rich, and have this in common—that they carry their silver perfectly mineralized, and never native, as in the Washoe mines. While, therefore, the almost universal method of beneficiating the Virginia ores is amalgamation without roasting, it is necessary in this region that amalgamation should be preceded by chloritic roasting. Taking into consideration all local circumstances, we believe that the "Silver-amalgamation Process," as developed years ago, in Freiberg, Saxony, will be found the most advantageous for Reese River.

The veins of the Old System are found in greatest abundance in the Reese River District itself—a subdivision of the country, having its centre at Austin, and taking its name, as does the region generally, from a small stream, which flows through the narrow flats, from the junction of the Toiyabe and Shoshone ranges, forty miles south of Austin, to a point fifty miles north of that town, where it sinks. The names Reese River, Amador, Smoky Valley, &c., are merely geographical in their signification; and it is only for convenience sake that we identify the district around Austin more especially with the old, rich, small argentiferous veins. These veins in reality are also found in other districts; but it would carry us too far for the limits of this Report should we enter upon a detailed enumeration of localities. We have already filled many pages with a general discussion which would not be necessary, were the country better known. No comprehensive view of it has yet been taken, and nothing is now before the public from which a clear idea of that country can be obtained, in its great topographical and geological features. This fact will excuse our extended treatment of that branch of the subject, and likewise explain the substantial repetition of this general view in many of our reports upon Reese River properties.

### PROPERTY OF THE MANHATTAN SILVER MINING COMPANY.

This property belonged, until recently, to the Oregon Mill and Mining Company, under which name it has already yielded large profits and won a wide reputation. It comprises:

1. One ten stamp mill, with amalgamating apparatus, capable of working seven tons daily.

2. Eighteen hundred acres of wood land, which will furnish fuel for about ten years. This land is some distance from Austin, and therefore not liable to trespass—a most important recommendation. The present cost of the fuel brought thence to the mill is $6 50 per cord.

3. Four silver-bearing quartz lodes, viz.:

(*a.*) *North Star Ledge.* (Original location, not Buel North Star.)—This lode has heretofore furnished the ore for the mill; but it is not worked at present, for the want of machinery to lift the deep waters. It belongs to Class II, Old System, and is very rich. Its pay-streak of ore is 12 inches wide. The ore brought to grass, all taken together, has yielded at the rate of $200 per ton in the mill. The production of the vein, when it was worked, was 5 to 10 tons daily, with a force of 15 men at $5 per day.

(*b.*) *Oregon Ledge.*—This lode now furnishes the mill with ore, yielding 7 tons daily, with a force of 12 men. The pay-streak is 15 inches. The gross yield of the ore, taken promiscuously, is $200 per ton. Old System, Class II.

(*c.*) *Blue Ledge.* Old System, Class I.—Very rich, but not yet opened.

(*d.*) *Southern Light Ledge.*—Just opened to a depth of 100 feet. Pay streak 15 inches. Six men take out 2 tons of rich ore daily. Old System, Class II.

The number of feet on each ledge is: North Star, 1,000; Oregon, 1,000; Blue Ledge, 800; Southern Light, 900. They are parallel, and sufficiently near each other to be embraced in one comprehensive system of workings.

The present shafts and workings, although they have already yielded handsome returns, are to be considered rather as prospecting work than as the proper foundation of systematic and permanent operations. In order to complete our view of the present condition of the property, however, before proceeding to indicate its capacity of future development, we adduce a few statistics from the books of the old Oregon Mill and Mining Company.

The mines have thus far furnished, on an average, 7 tons of ore daily, yielding $200 gross returns per ton. The cost of mining and smelting is estimated at $40 per ton. Assuming about 20 working days in each month, we should have,

| | |
|---|---|
| 140 tons of ore, mined and worked, giving a gross income of..... | $28,000 |
| 140 tons of ore at a cost of $40..... | 5,600 |
| Leaving a net profit of..... | $22,400 |
| Or per annum..... | $268,800 |

In reality, the profits of the proprietors, last year, were upwards of $240,000, representing interest at 24 per cent. on a capital of $1,000,000.

### PLAN OF WORKING AND DEVELOPMENT.

The following plan, communicated to the Company's agent in a confidential Report of the 27th May, 1865, indicates our conception, not of the full capacity of the property, but of the proper steps by which its development should be initiated, and the condition to which, in a short time, it may be brought.

The present openings on the Company's lodes have abundantly proved the richness of the ores, and have yielded handsome returns; but they are not located as well as they might be, with reference to future economy and ease of working. The relative position of the different lodes affords an admirable opportunity for systematic exploration.

I. *General Plan.*—The Oregon vein, which furnishes at present most of the ores beneficiated at the Oregon Mill—say 7 tons per diem—and the North Star vein, the upper workings on which are now deserted for want of proper hoisting and pumping machinery, can be worked, on account of their flat and similar dip, with a single engine. The present incline on the Oregon offers all facilities for hoisting and pumping on that vein. But the North Star, lying somewhat flatter than the Oregon, should be opened from a new point of entry. The distance between the vein-sheet of the Oregon and that of the North Star is between 140 and 160 feet. That is to say, a perpendicular shaft at or just below the outcrop of the former vein will cut the latter at a depth of 140 to 160 feet (if the dip of the North Star is not subject to some violent disturbance, of which there is no sign). We advise the opening of the North Star

by such a shaft, near the mouth of the Oregon incline. Even if there were no other reasons in favor of this plan, it is recommended by the following considerations:

The North Star and Oregon both belong to the old system of veins, a never-failing feature of which is the series of faults which we have already described, which shifted the veins, invariably westward, long before the present configuration of the surface was determined by neptunic agencies. These shifts continue to a depth of about 300 feet, if we may judge from the westward slides in the mines, which diminish with the increase of depth. The appearance given to the upper parts of such veins, in broken ground, is that of a connected series of lenticular masses rather than an uninterrupted vein-sheet. Now the proposed shaft would strike the North Star below its broken ground and on its settled dip—a considerable advantage.

But there are other considerations which speak for this location. It is contemplated to work both mines with one engine; and only very serious reasons could justify the location of the two shafts so far apart as to necessitate a cumbrous transmission of power. The proposed arrangement would be in this aspect most convenient. There can be but one objection urged against starting the North Star shaft from the mouth of the Oregon incline; namely, that it would have to be sunk through dead rock. But even this is not quite true. Before the shaft has reached the depth of 70 feet it will have cut the Blue Ledge (lying between the other two), which, although nowhere properly opened, has proved itself, by the remarkably rich chloride-rock obtained from its outcrop, a hundred yards west of the Oregon location, a vein of great promise. Indeed, the celebrated Revenue mine is located upon it. The opportunity of opening this lode *en passant*, by the North Star shaft, is an advantage offered, so far as we know, by no other locality in this region. In fact it is one ground of the very high estimate which we place upon the value of the Manhattan property; and it would be a great oversight to neglect it.

There is no danger of missing the Blue Ledge, since its whole vein-sheet lies between the Oregon and North Star, intersecting neither. Moreover, it is our opinion (based only, it is true, on

analogies) that the space between the two latter lodes is irregularly occupied by lenticular masses of silver ores, traceable to the disturbances of all three. A shaft which prospects this ground will certainly throw much light upon the character of the Company's whole mining field.

Finally, this shaft will stand in the middle of the 1,000 feet of the Oregon, and leave 800 feet of the North Star location to the East, thus affording opportunity for future developments to an indefinite extent. For the present, this one shaft will be all sufficient; but for future work a second shaft near the Oregon outcrop should be begun, 300 feet east of the first; and in due time, according to a systematic plan, a third shaft 300 feet east of the second—thus providing for an ever-increasing daily yield. Nothing is more important than this laying out of future operations, with reference to the necessities and growth of a great enterprise; and nothing has been thus far so much neglected in the Reese River country. The rich mines of Mexico are sufficient proof of the folly of such neglect.

II. *Immediate Work.*—Under this head we advise the Company:

1. To begin the North Star main shaft immediately.

2. To procure pumping apparatus for clearing the Oregon of deep waters.

3. To drift from the bottom of the Oregon incline, as nearly east and west as the dip of the vein and the drainage of the drifts will allow—300 feet in each direction.

4. To sink the Oregon incline 50 feet deeper, at that point start galleries parallel to the first, and continue in this manner, opening deeper stoping-grounds as fast as the main incline can be sunk.

5. To begin an incline on the Oregon 300 feet east of the present, to connect with the galleries from the old incline.

The details of this work cannot, of course, be prescribed beforehand, and must be arranged by the Resident Superintendent.

III. *The Southern Light.*—We are fully convinced that the present shaft is an excellent point of entry for this lode, the dip of which is too steep to allow of its being worked in one system with the others. The great richness of this lode and the facility of working it may make it the favorite one of the property. It has been cut by a perpendicular shaft, and the rich ore seems to set in below. We, therefore, advise the sinking of an incline on the lode from the bottom of the present shaft; and we do this, judging that, although the angle of the incline with the perpendicular shaft will be somewhat inconvenient, the inconvenience, in this particular case, will be nothing to the difficulty of driving horizontal galleries from the perpendicular man-shaft through dead rock. In the course of future developments, shafts should be sunk on the Southern Light, 300 feet apart, and stoping-ground opened by successive drifts, 50 feet apart, as already recommended for the Oregon.

If this plan is adopted for the four lodes, and put in practice at the most convenient points at once, a daily yield of 20 tons may be expected by the time the machinery necessary for beneficiating that amount can be erected. We need hardly point out that our plan does not contemplate the outlay of money for mining work that is not furnished by the mines themselves, since the operations recommended will afford from the beginning a continuous supply of ores.

IV. *Mill and Amalgamating Apparatus.*—The most eligible location for reverberatory furnaces for the chloritic roasting of the silver ores, before amalgamation, is immediately south of the present furnace-house. A shed like the present one should be erected, and four furnaces built in the southern part of it, while the northern part is reserved as a discharging-floor, joining the present one. If the elevation of the ground is not sufficient to allow of a discharge through an arch built below the hearth, the roasted ore may be raked out of the furnace directly upon the

cooling-floor, opposite the working doors. Each furnace should have a capacity of 900 pounds. We should advise building them a few inches wider and longer than the present ones, in order to obtain a larger oxydizing surface. In the construction of the present furnaces, a mistake was made in reducing the space between the hearth and the arch within too narrow a compass. It should be borne in mind that roasting is a process of oxydation, in the conduct of which we should avoid as much as possible all reducing influences. The flame of the fire-wood, containing particles of glowing carbon and carbonic oxyd gas, is a powerful reducing agent, which, coming in contact with the charge, tends to defeat the object of the oxydizing process. Hence the arch in the new furnaces should be 10 or 12 inches higher than in the present ones, especially just forward of the fire-bridge. The completion of these four would give the Company eight furnaces, of a capacity of 800–900 pounds each. Estimating the time of roasting at four hours, these eight furnaces would treat upwards of 20 tons of ore daily.

The following plan of amalgamation we have adopted, for reasons intelligible only to the practical and scientific metallurgist. In our confidential report to the Company, we have discussed this question at length; and we will only say, that the amalgamation we recommend has the advantage that it allows the existence of soluble chloride of copper in the roasted charge, and thus affords a simple safeguard against the loss of silver by volatilization—the presence of soluble chloride of copper, which is decomposed more easily than the chloride of silver, being considered an evidence that no silver has been lost.

The stamp-works should be divided into an upper and a lower department. In the upper division, towards the hill, 10 pans of the Wheeler pattern, one size larger than the present ones, should be placed, each capable of grinding 500 pounds of roasted ore. This grinding is necessary, because a great deal of the roasted ore is sintered together, so as to hinder amalgamation. They should be worked as at present, steam being employed for heating the ores, and more perfectly chlorating those atoms of silver which have escaped chemical action by sintering in the furnaces. These 10 pans would grind and prepare 20 tons of roasted ore daily.

In the lower or southern department should be placed 10 amalgamating tubs, such as are now in use, to perfect, by means of copper plates, the amalgamation of the ore prepared in the grinders. Each one of these tubs will amalgamate 500 pounds of the prepared ore in two hours. If one hour is allowed for discharging, the 10 tubs will amalgamate daily 20 tons—each tub receiving the ore prepared by one grinder.

The stamp works should be erected on the hill-side as near the mouth of the furnaces as convenience will allow, and so high that the stamped ore may be transported on tramways to the hoppers of the furnaces. If 20 tons a day are the assumed basis of capacity, at least 28 stamps will be required. As this number is not convenient, and as it is advisable not to work stamps to their full capacity, and as, moreover, one or more stamps will constantly be idle on account of broken tappets, or similar causes, we advise the erection of a 32-stamp mill, in 8 batteries of 4 stamps each, each stamp to weigh 600 pounds, and to be run at the rate of say 70 revolutions per minute. At this speed no part of the machinery will be heavily strained, and the wear and tear will be lessened.

An engine of 50 to 60 horse power, with ample boiler room for the generation of steam, especially in winter, for purposes aside from the motor, will be required for such an establishment as we haved sketched. Of course the engine-room should be carefully built and finished, so as to exclude all manner of dust and gases.

Finally, the works should be provided with a laboratory sufficiently furnished for tests and assays for the control of the different departments of the metallurgical processes.

### ECONOMICAL VIEW.

The above-described results could be brought to pass in four or five months, under skillful superintendence, with an outlay of about $70,000 cash, and a monthly reservation from the returns of the present mill.

The daily yield will then be 20 tons of ore brought to grass, crushed, roasted and amalgamated. This ore will probably be richer than has heretofore been taken from the lodes, since it

will be from deeper shafts and stopes; and the cost of mining and beneficiating will probably be less than $40, the present average, since the enlargement of the works and the development of the whole country will reduce expenses of all kinds. We will assume, however, as the yield $200 per ton, and as the expense of treatment $60 per ton instead of $40, leaving a net profit per ton of $140.

In one month of 20 working days there would be beneficiated 400 tons of ore, affording a net profit of ..... $56,000
or in one year..... 672,000
representing 67.2 per cent. on a capital of $1,000,000.

(All the sums mentioned in this report are reckoned in coin.)

The present cash value of the property, *i. e.* the principal on which it pays 20 per cent. annually, is $1,200,000. The expenditure of $70,000 more upon it will make it worth, at the end of four or five months, $3,300,000.

These are facts and figures which have a real basis, and are, in our opinion, no more uncertain than any other human calculations. If we may speak with frankness concerning ourselves, we have not the reputation of making very flattering reports. Of a hundred reports, issued by us within the last eighteen months, not more than a quarter have been unconditionally favorable. We believe that by our freedom in condemning unsound enterprises we have earned the right to praise with equal earnestness what we find worthy of praise. The data upon which the present Report is based were collected by Dr. Adelberg, during a careful examination of the country, which occupied many weeks—and our deductions from this data are moderate and reasonable. The realization of the great success we have indicated is dependent only upon the honesty, fidelity and skill of the Company's Superintendent.

ADELBERG & RAYMOND,
*Mining Engineers and Metallurgists.*

90 Broadway, New York,
*August* 3, 1865.

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