March 31st, 1926

The Shamrock Mining Co's property is situated in the Shoshone range of Mountains about fifty miles southwest of Austin, Nevada. Austin is the terminus of the Battle Mountain Railroad, which connects with the southern Pacific at Battle Mountain. The main tunnel of the mine is about one half a mile from the post office at Ione. Ione at one time a city of several thousand inhabitants has a population of only forty at present.

AREA:

The present holdings of the company consists of the consolidation of a number of old time producers, most important of which are the following:- Indianapolis, Wild Emigrant, Stone Wall, Violet and Crown. In addition to thesx the following claims are patented: Clipper, Keystone, Brown, and Berlin. The unpatented claims consist of the following: Liberty, Brown Extention, Fraction, Ajax, Shamrock, Shamrock No. 1, Pioneer Lode, Lower Mill Sight, Upper Mill Site, Pioneer Placer and Midas Placer. These claims cover about three hundred acres and include within their boundaries ideal tunnel sights and mill sights. In addition to the claims the company has the prior right to the water issuing from a spring about a quarter of a mile above their mill.

HISTORY:

The property was located in very early times, perhaps soon after the gold rush to California. At least five of the mines in the present consolidation have been worked extensively at different times. During the years of 1864 and 1865 these mines were worked very intensively and the town of Ione was one of the largest cities between Salt Lake City and the Coast. A short time after this activity the miners were lured to other camps leaving these mines practically deserted. Again in 1869 work was resumed by a New York Company who built a mill at Ione and handled the output of about ten miles in the district. This mill could run only a short time, however, and due to lack of ore was forced to close down in December, 1869. During January 1872 the camp had its last boom and for nearly two years two mills, which had been built during the latter part of 1871, were kept busy handling the output of several mines of the district. The two most important producers at this time were the Indianapolis and Stone Wall, both of which are owned by the Shamrock Co.

FACILITIES:

The greatest handicap to economic production of ore from the property is transportation since it is necessary to transport the ore by truck for a distance of 45 miles to Austin, and the entire distance is over a road which has no special upkeep. It is possible to have the ore transported under contract at $80.00 per ton, which is about all as well as the company could do by handling it themselves. Supplies and machinery coming from railway points to Ione are hauled at the same price.

CLIMATE:

The climate of this district, as the case with nearly all of western Nevada, is mild and has very little snow fall. The spring and Autumn are delightful seasons, and although the summer is hot it is possible to do a good day's work on the surface during the whole season. Under these conditions it is possible to work both the mill and the mine every day in the year as far as climate is concerned.

TOPOGRAPHY:

In general the hills are rolling with very few precipices and deep canyons Practically all points are excessible and it is possible to get to your highest mine in an automobile. Under these conditions it has been found necessary in the past to do most of the development through shafts which have been sunk on the dip of the veins.

Your present tunnel which has a length of nearly 1,000 feet encountered the vein toward which it was being driven, at a depth of 170 feet. This tunnel will make it possible to stope a large amount of ore in several of the veins without sinking deeper, but it will be only a question of a few years until deeper operations will be necessary.

In following a chute of ore below the tunnel level water was encountered at a depth of twleve feet. It is my opinion that all workings below this level will encounter water to a greater or less degree, and although it is impossible to state just how much water can be expected, it will be necessary to install pupping machinery.

the geological formation throughout your property porphrytic predominate and occur in a variety of form and color and texture. This phyry which is older than the ore deposition is very basic in its composition. Most of the rock found near the ore bodies contain at least 20% CaO and MgO. After the magmas cooled internal pressure and stresses caused a faulting along a number of paralles planes which strike about north 30 degrees west and dip to the north east. It was through these faults and breaks that the solution carrying the minerals forced their way, so that these breaks are now fissure veins of variouswidths, but for the most part less than three feet in thickness. One of these veins, the Crown vein, extends for a distance of more than 5,000 feet through your property. This general movement was brought about a number of step faults or thrusts, and the fault planes along which the movement took place had a strike to the northeast, and dipped at an angle of about 30 degrees northwest. In most cases where an ore body has been cut off by one of these thrusts it is necessary to follow it to the northeast, in order to pick up the veing again. The movement along the fault plane is nearly horizontal, so after the throw has been determined on any fault plane it is not difficult to locate the continuation of the vein after it has been cut off by the fault.

I was able to trace five distinct veins through various parts of your property. The mineralization in all the veins was aimilar, and although some produced higher valued ore than others I think it was a case of the concentration of values in various parts of one vein rather than a rich mineralization in any one vein in regard to that or any other.

There is one exception to the general northwest southeast vein direction. This is ~~exiting~~ the vein which your tunnel followed in. This vein which I have called the Pelton vein has a northeast strike and dips to the northwest. I am convinced that it is not a fault in this latter system. It is hard to determine what the movement along this fault plane was, but wherever it is possible to ascertain anything at all with regard to this movement I found that it was practically parallel to the dip. I think it was merely a cross fissure and undoubtedly recieved its mineralization from the main source.

An interestin condition is noted at the end of most of the workings and was likely the condition which caused the cessation of operations. In almost every case the ore had been cut off by a flat thrust fault, and the rock exposted beyond this fault was a sort of breccia consisting of solid pieces of porphyry surrounded by bluish clay. The porphyry contained in this breccia was even more basis than that surrounding the ore and would, perhaps, be listed under a basalt or diabase. This rock is undoubtedly a metamorphic rock and consists of a mixture of the porphyry which extruded and the country rock through which it flows. Very little ore has been discovered beyond this breccia in workings below the surface. But outcrops of ore prove that the breccia had little effect upon the ore body as a whole, but acting as a filling in the thrusts it was encountered wherever the ore was faulted.

Another peculiar situation brought on by this flat thrust series was the apparant evidence that the ore did not go to depth. It can be easily seen how such an idea could come from the arrangement. I noticed that in every case where ore is being followed down, encountered this soft breccia, that drifting was immediately resorted to in order to get away from it. However, understanding the conditions it is evident that the procedure is such a case would have been to sink through breccia and drift in the direction which the ore had faulted. In my examination of the Indianapolis mine I was somewhat surprised to see how unerringly the ore was picked up after having been cut and this mine would have had a much longer period of production had it not been for the fact that water was encountered at a depth of 265 feet in their incline. I do not know what efforts were made to mine below the water level, but I am of the opinion that as soon as water was encountered in any of the mines of the district that operations ceased. At any rate there is no evidence of a pumping plaint having been installed in any of the mines and the task of pumping against a head of over two hundred feet was a big problem until modern machinery and power came into use.

DEVELOPMENT:

The development on your Crown claim consists of a number of shallow shafts which have followed the ore down the various distances, the three main shafts being: Crown No. 1 which is about a thousand feet up the gulch above your tunnel shaft. This shaft followed the ore down a distance of 75 feet, and exposes a width of vein from three feet to four and a half

feet.

Cont.

vein would permit of mining and milling at a profit. Crown consists of a two compartment shaft which follows the ore down , where it encountered a fault. A small amount of drifting was rom the bottom of this shaft, but nothing of importance was cut his drift. Crown No. 3 shaft is the principal development was was e up to the time that your company took up the property. This shaft followed the ore down a hundred and six feet and after losing it at this point did more than a hundred feet of drifting attempting to cut the vein again. A small amount of quartz was cut near the end of this drift, but no ore of commercial value was opened up. Your company during the last two years has driven a main tunnel a little over a thousand feet, and have encountered one of the ore bearing veins. It is from the ore encountered in this tunnel that you have made the shipments. Your tunnel runs along the ore bearing vein for nearly two hundred feet, and although very little development work has been done on the vein itself it has yielded some very rich ore. After having struck a fault which cut the ore off, the drift was continued along a fault for one hundred feet. Nothing of importance was encountered during this last hundred feet, of tunnel. In the middle of the streak a very rick streak of ore was cut and was followed to the water level about fifteen feet below the level. This streak yielded several tons of ore which ran over 500ounces when shipped.

A raise which is now following this ore upward has exposed ore of equal richness. About 700 feet from the portal of the tunnel across drift which was run to the north. This has been driven a distance of 1/2 feet without encountering anything of value.

On your Keystone Claim a large tonnage of ore was mined from a tunnel and winz, which followed the ore down for a distance of two hundred feet. I do not know why operations were stopped in this mine since the winz is filled with waste, but I am of the opinion that since the winz is filled with waste, but I am of the opinion that the bottom of the winze hit water level. The development of this claim is very important since three parables veins have been opened up. They carry the same class of ore of about the same grade and seem affected by the same faults. Development has exposed these veins for a distance of more than two hundred feet along the strike.

The Indianapolis workings are the most extensive workings, not only on your property, but in the district. I have learned from a reliable source that the production of this mine alone was over 5,000,000 ounces of silver. The shaft on this property followed the vein down on its dip for 265 feet, and stopping was done for a long distance on each side of its shaft. At various levels, namely the 50 foot level, the 100 foot level, the 200 foot level, and the 260 foot level. Drifts were run out along the vein and cross cuts to other veins were run which exposed four parallel veins. In this property as in all others, the richest ore was found in streaks likely due to an influence of cross breaks through which the ore flowed simultaneously with its passage through the main vein.

In your Violet claim another vein practically parallel with the four in the lower claim was developed. This mine yielded the highest grade of ore of any, and from the size of the dump was very extensively developed. A Cave in the main shaft made it impossible to inspect the workings, but I think that conditions would be found in this mind similar to those in the other mines that I inspected.

METHODS AND COSTS:

The mining under the present system has been rather carelessly done. Whenever a high grade streak has been encountered the ore has been sorted in a careless mannerm the high grade has been sacked for shipment and the rest put over the dump as waste. The effects of this method can be easily imagined. Most of the sorting was done under ground, where illumination was poor and where conditions are usually very poor for the clean sorting of ore. In this particular case the men who sorted the ore had had no experience of a similar nature before so it would not be surprising to find that the ore which was sakced contained a good deal of low grade material and the waste which was sent to the dump carried a quantity of ore. My observations while there convinced me that there was altogether too much guessing at values, for several samples which were represented to me as worthless, I found went over 60 ounces of silver to the ton when assayed.

I also found that the man in charge at the mine was the only one who understood the running of a power machine and also the only one who under-tood timbering. And my observations convinced me that his experience along that line had been limited.

Conditions in the property are such that it is absolutely necessary

...re which experienced miners and to have them in charge of ...tendent. Even under these conditions I doubt if you would ...he point where you will be able to sort the ore with absolute ... At the present time all the quartz that is being broken is being ... platform on the dump. In this way it will be possible to sort the o... cleaner.

...do not think it is a wise move to do any sinking until the vein has ... more thoroughly developed above the water level. We will encounter ...ny rich streaks going down below our tunnel level and the temptation to follow them will be great, but the cost of mining is going to be cut considerably if we do our mining above the water level first.

With experienced workers you should be able to cut the cost of development to one-third of what it is at present. The country through which your drifts are driven is not hard to drill and breaks well. The cost of ammunition should be low so that mucking is the main item of at least four feet of drifting per day.

MINE EQUIPMENT:

The equipment at the tunnel is in very good condition and consists of the following: one fifty horse power Y-type Fairbanks Morse Hothead engine, belt connected, with a 300 cubic foot per minute Ingersol-Rand air compressor of 300 cubic feet per minute capacity. At the present time this is so connected that only 200 cubic feet of air per minute is being compresse... but all that would be necessary to bring the compressor up to capacity would be a larger drive pulley.

A well equipped blacksmith shop with forge, anvil and dolleys for sharpening, steel, also four good mine cars with the necessary pipe rail, and tools for carrying on the work.

This equipment has a capacity great enough to run at least four drilling machines and by careful management could efficiently handle more, so I consider the equipment at the tunnel of sufficient size to handle your wants along this line for a number of years at least.

PRODUCTION:

It would be impossible to state just how much ore has been produced by t... various mines owned by your company or to come to any definite conclusion as to the grade of the ore that this property has produced. However, some idea of the quantity and quality of the ore can be obtained after inspecting the workings and sampling some of the pillars and faces of ore which are left. In addition we have various reports made to the U.S. Genelogical Survey by Mr. Raymond, one of their reports made by their Mr. Raymond & one of their engineers who did a great deal of geneoligical work in this district and other districts near it during the years 1869-70-71- and 72.

During the boom days of the district 1864 and 65 the town of Ione supported a newspaper. The advertising and extracts from this source gives us additional information.

After taking into consideration the size of the veins the fact that not all of any one ore contained ore of commercial quantity.

I estimated from a careful inspection that there had been ore produced by the mines along the Crown vein about 1000,000 tons. The Violet Mine although inaccessible at the time of my examinations, has produced about 25,000 tons judging from the size of the dump and the width of the vein at the surface.

Since your company started operations only 16 tons have been shipped to the smelter.

Now as to the quality, the advertiser states under date of October 29th 1864, that the Keystone is a very valuable property that the shaft is down 90nfeet and that a sample of the ore on assay return of over 160,00 per ton.

Under date of August 12th, 1865 this paper givesn an account of a vein being followed on the Silver Moon claim which goes in writing of the Indianapolis Mine. In 1872 Mr. Raymond states that 26 men are employed mostly on deadwork. But 3 tons of ore is being mined per day which amounts pays all expenses and a little over. Similar accounts of the Stonewall, Wild Emigrant, and Violet Mines are sufficient to prove that the ore that was during the time covered by the accounts was of very good grade, averaging over $100,00 per ton for all ore shipped to the mills.

The ore which has been shipped by your company has averaged $263.00 per ton or about 400 Oz. silver. Examinations of the faces where mining is being done convinces me that ore of this grademor even better can be mined at present.

I would estimate that production which would be possible with one day of over three hundred Oz. Silver and in addition about one third tons per say of ore going in excess of 1500 Oz. silver per ton.

...ction cont.
...course with more development this could be increased.

RECOMMENDATIONS FOR MINE DEVELOPMENT:

As soon as it is possible to install a new superintendent together with three or four experienced miners I would suggest that the following program be carried out; follow the ore streak at every point where it is possible to mine, sack the material that is known to be high grade at the places where the ore is broken, the rest of the material from the vein is to be sent to sorting platform on the dump. At this platform an experienced man under ideal conditions can make a very good selection. The quartz which he rejects as being too poor to ship us to be sampled at the end of each day and on the result of this sample the disposition of the quartz will be determined. The sample from this pile will be taken By the superintendent and assayed by the assayer.

The main drift is to be turned to the right until it has passed out of the fault zone when it can again be driven to the east to pick up the faulted vein, a very good place for profitable development would be where fault cut off the vein which the tunnel was first following. By driving a drift along the east side of this fault to the right of the main drift, it would be possible to pick up the faulted vein at a distance of about 27 feet as this is the throw of this fault on the surface.

I would not suggest any extensive plan of development at present for I feel that facts will be discovered i a very short time which will give us much more information in regard to underground conditions that it is possible to get from the present showings.

As soon as the mill is in operation there is several faces that it would be well to investigate, these consist for the most part of blocky quartz, which I was told would not go very high, but which I did not sample. As soon as conditions are such that the operations of the mill is assured it would be well to have all these faces thoroughly sampled to ascertain just what can be expected from them.

R.D. Gardiner.

REPORT OF THE SHAMROCK MINE

Your upper mill sight within the town of Ione there has been constructed a cyanide mill of about 25 to 30 tons capacity per day. This mill was constructed about three and a half years ago to handle the numerous dumps that are to be found on your property together with the lower grade of ore which you intended to mine. This mill was perhaps constructed in good faith and the management at the time may have felt that they could make a good recovery from the ores of your property by this process. I have not had a test run made on the ore but from the experience i Have had, I know that cyanide process will not work out successfully on this ore. This is due to several reasons, the main reason is that very little of the silver in your ore is in the free state. The cost of transporting cyandie to your mill would make its cost verynhigh. The small amount of copper would necessitate the use of a great deal more of cyanide than if no copper were present. The lead would be entirely lost if this method of concentration was used. Therefore, inspite of the fact that the mill is nearly completed to handle ore under the cyanide process, I am not in favor of using this process.

The process which would be ideal for the recovery of the values from this ore is flotation, and I am of the opinion that recovery by flotation would be exceedingly high. On advice from the U.S. Smelting Co. I shipped them a 75 pound sample of the vein in the Crown No. 1 shaft. They have promised to make a thorough mill test on this sample, and report to us what they consider the best method of treatment. They have been experimenting with ores from all parts of the West for a number of years and should be able to give us some very valuable information in regard to our problem. They have promised to make this test as soon as possible so I look for a report from them within the next two weeks.

In the event that we change to flotation, which I think very likely, you would be able to dispose of at least six of your large tanks that are now at the mill. All of the other machinery is identical with the machinery used in the flotation mill. The additional equipment that would need would be a filter and a small air compressor. The air compressor is used for the purpose of sucking the solution through the material to be filtered and for supplying the small amount of pressure needed to remove the cake from the filler. In talking to mill men I have received the information that a filter sufficient to handle your concentrates could be had at a very reasonable price, less than $1,000 with the possibility of picking one up second hand at a price much less. You will need also a thickener. These are practically indispensible to a flotation but are not expensive. The price of one sufficient for your needs would be about $500.00. Since the removal of the Fairbanks-Morse Engine to the tunnel your mill is without power, and I am not in a position to recommend an engine at present. Since I am not sure just what machinery you will install for the new process. In the handling of this item I am quite sure that an engine probably of the diesel type could be secured from properties not far from your own where electric power has supplanted their oil burning engines.

When it is decided that the mill is to be finished I do not think it will take more than a month to put it in operation, I would estimate the cost at about six thousand dollars ($6,000.)

The amount of ore available for the mill is figured on a basis of over 20 ounces silver. I would place at about 1500 on the dumps of the various workings. This is a conservative estimate of the quantity in the dumps that has already been sampled. Just what we could expect from the mine is problematical, but I do not think that an estimate of 15 tons per day would be too high. Once the mill is running we would call everything mill ore that went less than 125 ounces of silver to the ton. In addition to our own reserves of mill ore, there is a vast amount of ore on various other dumps in the vicinity assured by small operators within ten miles of our mill, that there would be available more than fifty thousand tons of ore that could be profitably milled by flotation. I sampled the tailings dump of one of the early mills and although much of the dump did not go, I found one portion of about 1500 tons which carried more than 10 ounces of silver per ton. If this is a fair sample of the dump from which it was taken the whole dump could be profitably treated. When it is considered that two thirds of this dump will pass through a mesh screen the milling process is very much simplified, since the crushing cost is practically nothing.

In my inspection of the mill I found it to be well constructed, and perhaps, capable of supporting any machinery that is necessary in the process. In order to be sure on this point I have written to the California Iron Works who had charge of the construction and asked them to give me their personal guarantee as to its stability. This company is a big company with a good

Milling cont.
reputation and if they recommend the mill as being O.K. in construction I would feel quite safe in going ahead without improvements.

In trying to arrive at some conclusion as to what milling the ore would save I have compared the cost of treating the ore at the mill and sending it directly to the smelter. From the smelter returns from the five shipments that have been sent I have obtained the following costs: Haulage $20.00 per ton. Freight $13.00 per ton, Smelting ~~$1x0x~~0$10.50 per ton, sampling $1.00 per ton, assaying .50 per ton. Adding $5.00 per ton to this for mining and the total is $50.00.

The estimated cost of handling the ore at the mill figured on the basis of crude ore is as follows: Mining $5.00 per ton, hauling to mill $1.00, milling $4.00 per ton, making a total of $13.50 per ton or a saving of $36.50 per ton, so it can be seen that the most successful way of running the property is to mill all but the very ~~mixgxxxx gradex~~ highest grade of ore that you mine.

SUMMARY:

In summing up the reasons which I consider have been responsible for the mine's not paying I will site the following: lack of competetent management, lack of experienced superintendent, and lack of miners, ore not cleanly sorted, which has resulted in tons of pre going over the dump, development costs too high, no definite goal for develop,ent, loss of ore at fault, due to ignorance of men who have examined property, too much stress put on dumps, too much guess work about value, tunnel started several hundred feet high, accomodations poor, and efficiency everywhere at a minimum. These items are very serious but you must admit that they can be easily remedied, if the whole system is changed. In the report I have suggested the remedy for each of these conditions and I believe it can be remedied without loss of time or money.

In my opinion the property has great possibilities and although I do not think that we will ever be able to encounter stopes of this high grade ore, which are comparable to some of our stopes in Bingham, Tintic or Park City, still I believe that the mine can be made to pay dividends on the stock, and the deeper operations will open up more valuable ore bodies than have yet been found. So I recommend that the changes which I have suggested be made with all possible speed, for if they are carried I am sure that the mine will be able to run at a profit.

Respectfully submitted

R.D. Gardiner