Nevada
Nye County
Round Mountain District

Round Mt Placer
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I am not unmindful of the honor conferred by your inviting me to say a few words about our placer operations at Round Mountain; nor am I unmindful of my limitations, as this is my first experience of this kind. Unfortunately, I have been away from my office ever since I received a letter from Mr. Carpenter, Professor of Mining of the Mackay School of Mines, to say a few words to this gathering, and what I am saying tonight has all been prepared since yesterday afternoon. This is not by way of an alibi, but by way of an apology. I do not pose as an authority on placer mining, but will endeavor to give you a few facts concerning our hydraulic operations now being carried on by Nevada Porphyry Gold Mines, Inc. My feeling tonight is somewhat akin to the man who remarked to a friend that he had been studying French for three weeks. The friend remarked, "I suppose you speak French fluently." The man replied, "No, I do not, but I speak it as well as anyone who has been studying French three weeks."

The Round Mountain district is situated on the eastern flank of the Toquima Range, about 45 miles north of Tonopah, the nearest available railroad point. The district is reached daily by automobile stage from Tonopah by way of Manhattan.

The ore deposits of the district were discovered in February 1906 and the Camp has been a continuous and consistent producer ever since. Granitic rocks occupy a large part of the Toquima Range and are intrusive into sedimentaries. The intrusive granite is supposed to be of early Tertiary Age. The ore bearing formation of the Round Mountain district proper, which comprises Round Mountain, Stebbins Hill and Fairview Mountain, is described by H.G. Ferguson of the U.S. Geological Survey, as porphyritic rhyolite, close to quartz latite in mineral composition; this rhyolite of later Tertiary Age may be a phase of the earlier granite intrusion.

The principal veins on Round Mountain proper are known as the Los Gazabo, Keane and Placer. The Los Gazabo vein outcrops about midway between the crest of the mountain and the detrital wash at its base. It has, roughly, an east-west strike and dips about 18 degrees north. It has been productive to a depth of something over 900 feet on its dip. The Keane vein is north of the Los Gazabo and has a general northwest-southeast strike with a dip to the southwest. The Placer vein is parallel to the Los Gazabo in both strike and dip and was uncovered by hydraulic operations a few years ago. Its development was retarded until recently by hydraulic operations carried on above its outcrop, saturating the underlying area with water from placer operations. The Los Gazabo and the Keane vein are about 350 feet apart and between them is a broad sheeted, or stringer, zone. The strike of this zone is approximately north 60 degrees west and it is thought that this zone contains sufficient values in gold to justify mining it as a whole, providing proper equipment and mill capacity are provided. The erosion of the Los Gazabo, the Placer vein and the intermediate sheeted zone is responsible for the principal placer deposits of Round Mountain.

Credit for discovering the placer possibilities of the district is due to Thos. F. Wilson who came to the district the first year of its discovery. Many stories are told as to how his discovery was made. One is, that in walking over the south slope of Round Mountain he sat down to rest in a small ravine or gulley, that he picked up a handful of gravel and that in idly pouring it from one hand to the other, the wind carried away the dust and lighter particles and that finally he

saw a couple of grains of gold; another is, that he made his discovery in the orthodox manner by prospecting the south slope of the mountain with a bucket of water and a small gold pan. Be that as it may, he secured a placer lease from the Round Mountain Mining Co., the then owner of the principal lode mine of the district. He constructed and put into operation two or three crude dry washers. Into this the gravel, or eroded material, was shoveled; about twenty men were employed and, in a period of some three months $33,544.85 was recovered. While no definite figures are available as to the amount of yardage, it is the generally accepted belief that the material handled by Wilson averaged from $2 to $10 per yard. This, I think, is conservative for the reason that his operations were confined to gulches, small basins and other natural concentration areas and the further fact that later, in an area immediately below and lower down on the slope of the mountain, D.S. Llewellyn and others hydraulicked over 100,000 yards that gave returns of nearly $2 per yard. During the early days of the Camp yardage figures were not kept but the Round Mountain Mining Co. has since measured the various excavations so that an accurate idea of the total yardage hydraulicked is available.

From 1906 to 1915 all placer operations were carried on by lessees. In 1907 a company known as the Round Mountain Hydraulic Co. was organized. Water was brought in from Jefferson and Shoshone creeks through a pipeline of various diameters ranging from 15-in. pipe in places to 12-in. in others. This company, however, was ill-fated, went into bankruptcy and its properties were later taken over by a corporation known as Round Mountain Power and Water Co.

The total production of lessees from 1906 to 1915 was $442,939.27 from 272,240 cubic yards, or an average value of $1.63.

In November 1914 the Round Mountain Mining Co. began the construction of a pipeline from Jett Canyon to its placer deposits. This pipeline is 45,336 ft. long. The first section, beginning at the intake in Jett Canyon, consists of 14,000 ft. of riveted steel, asphaltum dipped pipe, varying in diameter from 30-in. at the intake to 15-in. The second section consists of 28,000 ft. of lap-welded steel pipe, varying in thickness from 1/4-in. to 5/16-in. This lap-welded pipe was necessitated by the fact that the line from Jett Canyon to the mine is an inverted syphon and in the floor of Smoky Valley the pipeline is 1142 ft. lower in elevation than the intake. The maximum static head on the pipeline in the floor of the Valley is equivalent to a pressure of 495 pounds per square inch. The third section is 3,336 ft. long of riveted steel, asphaltum dipped pipe 15-in. in diameter. The pipe is laid in a trench 42-in. deep to guard against freezing in winter. 7550 ft. of the line is of slip-joint riveted pipe, laid in the canyon where the pressure is light. The balance of the riveted pipe is plain end, with bolted, forged steel couplings. The pipeline traverses Jett Canyon for 10,000 feet, then continues in a straight line across Smoky Valley to the mine. The line was designed with a safety factor of five and is equipped with drains, air valves and pressure relief valves and cost $150,557.11. The Jett Creek water rights cost $28,410.16. The difference in elevation between the intake of the Jett line and the placer banks is 650 feet.

Placer operations on company account were begun July 13, 1915 and were continued to September 3rd of that year when the flow of water in Jett Creek had decreased to such an extent as to make profitable hydraulic operations doubtful. This first work resulted in 18,150 yards of gravel being hydraulicked, yielding $36,413.70 in recovered bullion. The cost was $11,058.18, leaving a net realization of $25,355.52. The value per yard recovered was $2 and the total cost per yard was 61¢.

During all of this construction period and the early placer operations I was manager of a silver-lead-zinc mine in California but in 1916, due to the illness of Mr. J.R. Davis, General Manager of the Round Mountain Mining Company, I assumed the management of that company. I had had considerable experience in managing various types of lode mines but, aside from the early operations of the placer lessees of the Round Mountain Mining Co., had never seen a placer mine.

There are very few hydraulic placer mines operating at this time. This was true, as well, in 1916, the reason being the unfavorable State and Federal laws, which are considered just by the Federal Government and the Agricultural interests, but discrimnatory by most of the mining interests. However, in Trinity County some placer mines were in operation and I spent some three weeks visiting all of the placer mines in that section, the principal one being the La Grange property near Weaverville in Trinity County. However, I was unable to find anything comparable to the problems facing us, as every placer mine, as well as every lode mine, is an individual problem and, while all placer mines are more or less fundamentally alike, the water supply, character of material to be moved, character of the gold to be recovered and many other things create problems peculiar to each district. Most hydraulic mines are the result of glacial action or stream concentration. The rocks are generally smoothed and rounded by this process and in some, the percentage of rocks is negligible. In most placer mines the gold has traveled many miles. At Round Mountain none of the gold had traveled more than a few hundred feet. There is a large percentage of boulders, angular in type, making it difficult to move them.

Hydraulic placer mining, at best, is crude and primitive and there is very little literature available on the subject. However, two types of riffles for recovering the gold seem to be standard. One type is known as the pole riffle which consists of peeled poles or steel rails laid longitudinally in the bottom of a sluice box. The other type is known as the Hungarian riffle, consisting of angle iron or short T rails laid transversely to a sluice box. (At Round Mountain, at the time I became manager, they had riffles of a type I had not seen at any property but which may have been in more or less general use. These riffles consisted of pine blocks about 6-in. long, set in the bottom of the flume, transversely to it, in rows. Each row was separated by what is known as a riffle stick which consisted of a 1 x 4 board. The flume was 2 ft. wide and very often during the heighth of the season a section from fifty to one hundred feet of these riffle blocks would rip out due to the angular rocks. Much delay was occasioned and, undoubtedly, some gold lost.)

The Hungarian type of riffle appealed to me as probably being the best gold saver but, being crosswise to the flume, offered considerable resistance to the flow of the material, due to friction and the cross members greatly retarding the flow. The pole or longitudinal system permitted a free flow of the material but struck me as not being desirable for the reason that being laid directly on the bottom of the flume, gravel and rocks would pack between the poles and possibly allow the escape of some of the gold, especially the finer particles. I, therefore, devised a system of combining both the accepted types of riffles. 3 x 4 timber cross-ties were placed in the bottom of the flume at intervals of 4 to 6 ft. Upon them are laid parallel rows of 25-lb. steel rails. This permits no retardation of the flow of material. The cross-ties beneath the rails act as cross-riffles and the rails being suspended for distances varying from 4 to 6 ft., a certain vibration is set up by the rocks passing over the rails, causing the gold to settle and be caught below the rails by the cross-ties. In addition, the rails are blocked into the flume with wooden blocks, the top of the blocks being level with the top of the rails. These blocks also serve the purpose of riffles without retarding the flow of the material. At

intervals of about 100 ft. cast iron blocks reaching to the top of the rails are secured to 3 x 10 cross-timbers. This divides the rails into riffle sections and in case of a rail becoming dislodged, only one section will be affected and repairs are quickly made. However, to date we have yet to have any trouble of any consequence on account of rails becoming loosened or dislodged.

At the beginning of placer operations the practice was to use a giant at the lower end of the flume to pipe away the tailings as they accumulated. As water was the vital and controling factor something had to be done about that, so a system of finger or branch races was installed at the lower end of the flume together with a system of gates which permitted diverting the flow from one branch to another, enabling a branch to be extended while the tailings were emptying through another. This permitted the use of all the water for hydraulic purposes.

One decided advantage of the rail riffle is the fact that most of the wear on the rails is in the center of the flume. The center rails will permit the hydraulicking of about 150,000 yards of material before showing appreciable wear. They are then moved to the sides of the flume and the outside rails moved to the center. In this way the wear on the rails is equalized and they all wear out at about the same time.

It also became apparent that the amount of water available from the Jett Canyon supply was inadequate for the efficient operation of the placer, so in 1916 I arranged to purchase from the Round Mountain Power and Water Co. (which company, by the way, was the successor-in-interest of the Round Mountain Hydraulic Co., having purchased all of the assets of the latter company at a bankruptcy sale) the water rights of Jefferson, Slaughterhouse and Shoshone canyons, together with the Jefferson pipeline, before referred to. This purchase included all of these water rights together with some small tributary ranches and an assignment of all of the interests of the Round Mountain Power and Water Co. in the Round Mountain district, such as leases, etc., together with one fractional mining claim and a property known as the Round Mountain Daisy Mining Co., later absorbed by the Fairview Round Mountain Mines Co. This enabled us to handle a much larger yardage, extend the duration of the placer season and reduce costs.

After the high water season had passed, in 1916 and 1917, it was the practice to close the valve at the end of the Jett Creek line and for several hours back the water up in the line; then open the line and secure sufficient water for short periods of hydraulicking. Despite the safety factor on the line this did not seem a very good practice so in the latter part of 1917 an earth dam was built above the intake in Jett Canyon. This dam cost $3000 and permitted the impounding of sufficient water to provide a full head for a large monitor for eight hours and the use of the water at full efficiency on one shift, - eliminating the expense of the other shifts.

The handling of the rocks has always been a decided problem. The percentage of rocks in the placer banks varies from 5 to 20 percent. Various methods have been tried. First, the larger rocks were block-holed and blasted and rocks of one cubic foot or less were sledged; then the larger rocks were blasted and an attempt made to run all the other rocks through the flume, but the proportion of rocks soon became

too great and this was abandoned.

The present practice is to block-hole the very largest rocks and remove the others in two ways: (1) By rock cars which are hoisted out of the pit on a trestle and automatically dumped. This is done by means of specially constructed stone boats built on standard 30-guage mine trucks and wheeled from the pit on 12-lb. rails which are connected by means of switches to the rails on the trestle leading out of the pit. A movable trip is placed on the trestle and when a lever on the boat strikes the trip the car is automatically dumped. (2) By a boom derrick, - In using the boom derrick a flat, heavily constructed iron-bound timber platform is used and fastened by a chain from each corner to a hook on a cable passing to the derrick and then to an electric hoist. The pole of the derrick is set at a slight incline so that the boom automatically swings out of the pit. A man is stationed on the dump pile to unhook two of these chains. The hoist is then started and the boat automatically emptied of all rocks upon it. The empty boat is then swung back to the placer pit by means of a 3/4-in. hemp rope attached to it. Three boats are used so that two are being loaded while one is in transit.

In block-holing, standard jackhamer drills are used and the depth of the holes varies with the size of the boulders, the average depth being 6 to 12 inches, and the amount of powder from a part of a stick to as much as a stick and a half of 40 percent dynamite. The original flume was 2 ft. wide and 2 ft. deep of varying grades and in many ways unsatisfactory; in fact, when its construction was started in 1915 the exact position of the bedrock in many places had not been determined so that it finally reached an elevation from 15 to 30 ft. above bedrock.

In 1916 a drilling rig was purchased and during that year and 1917 considerable drilling was done to establish the position of bedrock in various areas. In 1921 a new main tail-race was begun and carried into the placer banks on a standard grade of 4-in. to 12 ft. This new race was 3 ft. wide and 3 ft. deep with the same type riffles as used in the former flume. This new race is from 15 to 30 ft. lower in elevation than the first one constructed and the increased size has proved to be a decided improvement, both as to yardage moved and cost of material handled. However, this race has about outlived its usefulness and late this fall it is proposed to bring in a new race to reach an entirely different part of the property which has been thoroughly drilled and sampled. It is expected that this race will be the one used for the next fifteen years. It probably will be 3 ft. wide, 3 ft. deep, of a standard 4-in. to 12 ft. grade and constructed of timber treated at the source of supply to prevent deterioration through decay, caused by the supporting members being buried in the soil.

The present flume is constructed of 2 x 12 plank with 2 x 12 lining boards. The supporting sills and side members are of 4 x 4 timber with 1 x 6 braces. The sides of the flume are of rough lumber but the bottom is constructed of clear and better plank 18-in. wide, surfaced on the sides and edges, thereby reducing the liability of the loss of quicksilver, which is used in the flume.

The depth of the placer banks varies; the height of the present bank is about 40 feet.

On account of the angular rocks, the giants are not placed in the orthodox manner, - directly opposite the banks to be hydraulicked, - but are generally set at an angle to the banks, rather than in front of them, as the angular rocks do not pass readily into the flume and the force of the water is generally needed behind the

material, rather than in front of it. It is also necessary for the giant operators to use care in not moving too much soil without a proper proportion of rocks; otherwise, a pile of rocks accumulates and, without the water having proper density and bouyancy due to the proper admixture of soil, an undue proportion of rocks have to be removed as above described.

The amount of water available at the placer banks is approximately 200 miners inches from each source of supply. Two small or one large giant is used in each pit. Two pits are operated at the same time to permit cleaning-up the sluices in one pit while hydraulic operations are going on in the other. The lines are so arranged as to permit of using all the water in either pit or prorating it as occasion demands, through the use of a system of by-passes and valves. At present eight rails are laid longitudinally on the cross members. Quicksilver is added while hydraulic operations go on. The amount is dependent upon the yardage and the value of the banks determined by panning tests. Clean-ups are made semi-monthly by running down about 200 feet of the head of the flume, removing the lining boards, blocks, rails and cross-ties, while a small head of water is flowing through the flume. The blocks, rails and cross-ties are thoroughly scrubbed with brooms to remove any particles of gold or amalgam clinging to them. Additional quicksilver is then added and the head of water increased, causing the remaining material to move slowly down the flume. As this goes on, the rocks are forked out with 8-tine sluice forks. The gold, or amalgam, moves down the flume behind the lighter material and is scooped up, placed in buckets and taken to the mill for regrinding in a clean-up pan, as in the clean-up much of the gold is associated with quartz and other vein material. The resulting amalgam is then retorted, melted and shipped by firstclass registered mail to the American Smelting & Refining Company's plant at Selby, California. The bullion is insured for its full value from the time it is deposited in the Post Office at Round Mountain. This method has proved cheaper than transporting the bullion to the railroad and shipping by express.

The gold averages about 635 fine and its value is somewhat dependent upon the price of silver; however, at the present time, it is worth about $13.25 per ounce. Most of the gold is coarse and the proportion of gold to quicksilver in the amalgam will average 60%.

Yardage measurements are also made twice a month. The flume is at present over 5,000 feet in length, lined throughout with steel rails. At the end of each worthwhile season, the flume is cleaned up for a distance of several hundred feet beyond the point where the semi-monthly clean-ups extend and, in the fall, all rails are removed and the balance of the material in the flume allowed to dry, after which it is hauled in trucks to the mill, and milled the same as ore. This material, at times, has had a value of $60.00 per ton.

Until 1920 the pipelines from both sources were connected direct to the giants. To relieve the pressure on the pipelines and provide additional impounding facilities, a small, reinforced concrete dam was built in 1921. This dam is about one mile east of the placer banks, at a point where a gulch provides impounding facilities. It is 22 feet high in the center of the gulch and, with its storage capacity and the water flowing in from the two pipelines during the low water season, impounds sufficient water to permit the continuous operation of one large monitor for seven hours. The difference in elevation between this dam and the placer banks is 350 feet.

The amount of material moved with the above water and head varies considerably and depends upon the height of the bank and the amount of rocks and cemented material. The range is from 32 cubic yards per hour to as much as 110 cubic yards per hour.

At times, a considerable proportion of cemented material in the placer banks makes blasting desirable. When this is necessary, the practice is to drill 5-inch holes with a Star drilling rig. These holes are drilled to bedrock, parallel to the bank, about 50 ft. apart and 25 ft. from the edge of the bank. A sample of this practice is as follows: four of these holes were drilled to an average depth of 46 ft.; each hole was sprung with fifteen pounds of forty percent dynamite, after which each hole was loaded with one hundred seventy-five pounds of Judson powder. This resulted in thoroughly shaking and loosening 12,000 cubic yards. The cost of these holes, including setting up the drill, moving it from hole to hole, sharpening drill bits, drilling, explosives and labor, was $582.95, or about 4-1/2 cents per cubic yard.

The bedrock is very rough and uneven and after it has been cleaned as much as possible by means of the monitors, it is allowed to dry and is then cleaned by hand, using specially constructed small tools and whisk-brooms to clean the gold out of the crevices of the rough, uneven rock.

The cost of bedrock cleaning per yard of material moved varies with the height of bank hydraulicked, character of the bedrock and many other factors. In one year, when 128,000 yards were moved, the cost of bedrock cleaning was 15-1/2 percent of the total cost of the year's operations.

During this same year 72.7 percent of the recovered gold came from the semi-monthly cleanups; 11 percent from bedrock cleaning; 9 percent from the lower reaches of the flume and 7.3 percent from milling residual material in the flume.

The total placer production since operations were started on Company account is $852,981.70 from 1,111,144 cubic yards, which, added to the lease production, makes a total production to date of $1,295,920.97 from 1,383,384 cubic yards, or, 94 cents per cubic yard.

Methods of sampling the placer banks preparatory to hydraulic operations may be of interest. An area is surveyed and divided into blocks one hundred feet square. Holes are drilled, or pits sunk, at each corner of a square. Samples of the drill holes, or test pits, cover intervals of ten feet. The samples average from sixty to one hundred pounds each. They are thoroughly dried, weighed and passed through a small sluice box about sixteen feet long and six inches wide, using the Hungarian type of riffle with quicksilver in the sluice box. After each sample is run through the box, the sluice box is cleaned up, the recovered amalgam retorted and the retorted gold proportioned against the weight of the sample.

In computing yardage and values, each square is divided into four equalateral triangles and a computation separately made of each triangle, as this gives a much better safety factor than using the four holes at the corners of the square.