Return to Albert Eckard

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Item 43

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OPERATIONS
OF
ROUND MOUNTAIN GOLD DREDGING COMPANY

Note :- The following are comments on the effects of mine operating policies and the variances from the basic flow sheet, as developed in pilot plant practice, on the failure of the project as a whole. In the matter of mining policy and methods it is not the purpose of this report to comment on the mechanical failure resulting from the methods adopted but only its effect on the entire metallurgical aspect. The flow sheet variances will be discussed progressively as we proceed from the stockpile to the tailings disposal units. It should be added here that practically no operating details were submitted to the Lessor Company and the following notes are to be considered as originating from the personal experiences of the writer.

(1) The work in the pilot plant was predicated on a job of stripping down to a line of minimum pay materials and no serious effort was made to determine the characteristics of the materials in the stripping zone. The decision to change the policy of mining to include the waste materials as plant feed was not followed through to include the metallurgical practice.

The Material in the stripping zone consists largely of granite sands, granite fragments and granite boulders, with occasional tongues of broken down ore host rocks from the lode area. The latter were responsible for the drill holes and shafts showing sporadic zones of value up in the otherwise barren overburden materials - this situation did not exist in all of the drill holes or in all of the shafts, only an occasional occurrence to the point of setting up a probable value of 8¢ to 10¢ per cu. yd. for the stripping zone as a whole. Aside from the thought of conforming the mining operation to the plan which was adopted it was also considered that the recovery of the gold, although not of pay value, would help to defray the cost of getting rid of the stripping. This in itself would not have proven fatal, at least in the shallower areas, if the operation had been successful because certain parts of the recovery plant were enlarged, at a considerable additional cost, to take care of the tremendous load of granite undersize but from a practical metallurgical stand-point the effort was seriously wrong.

One of the most important factors in gauging the required capacity of the recovery portion of any washing plant is the percentage of minus material from the washing trommel. The terrific impact of granite undersize on the jig sections, from a recovery point of view - the wear and tear of this highly abrasive material and the strain on the dewatering and waste disposal units were serious matters which more than offset any other consideration. The waste disposal units required immediate enlarging to handle the increased load. As a general observation the practice of diluting mill feed with waste is wrong and the necessity for doing so to meet the demands of simplification in the mining practice would have to be of a top priority order to justify it. Aside from the mechanical and recovery disorders developed by this all inclusive mining program the dilution of certain segments of the washing plant residue made it impossible to render a forecast as to their per ton value. It was, therefore, a part of the overall planning to provide ways and means of making requisite determinations during the progress of the operation and to handle the situation in accordance therewith. In the pilot plant work one segment of the residue stood out as demanding more than ordinary attention and that was the intermediate size range from minus 5/8" to plus 8 mesh. This was considered of sufficient importance to bring forth suggestions that space should be provided in the plant for the purpose of housing the necessary equipment, if the sampling indicated this

to be feasible. In the pilot plant work the minus 8 mesh plus 100 mesh indicated a per ton value between 30¢ and 40¢ and the minus 100 mesh (thickener underflow) from 40¢ to 60¢ per ton. To do anything with these finer products, at the start, at their low value did not appear practical although separate stacking was discussed as a possibility. Our Company not having access to the actual determinations one could hardly pass judgement on these matters but no provisions were made in their behalf and all of the waste materials were stacked in the same pile except the thickener underflow. It is better than an even bet that the minus 5/8" plus 8 mesh, if it had not been diluted with overburden materials, would warrant the treatment suggested for it - it would be interesting to know what the actual plant results were on this product although if the determinations were made by the usual assay methods they would hardly be acceptable as accurate, the values consisting entirely of relatively coarse gold.

(2) Stock pile troubles, from the tendency of the material to stand at a steep angle, developed right from the start and, as far as we know, continued to the end of the operations. The experiences of many operators have proven this problem not so simple as it might appear although it is the consensus of opinion that more draw points would yield a satisfactory recovery from the stock pile without having to resort to a bull-dozer or dragline shovel on the pile to push or cast the material into the cone over the feeders.

(3) The pilot plant flow sheet finally as developed by pilot plant practice contemplated an adequate number of rougher and cleaner jig flows immediately following the washing trommel in order to scalp out, in the earliest stage of treatment, most of the recoverable coarser gold. Following this was a screen section to separate the primary residue into plus and minus 8 mesh for the obvious reason of making a separation which appeared desirable and to re-jig the minus 8 mesh, after dewatering, to make a further recovery of fine gold which would be certain to escape the primary jigs. This was intended to make a final residue of this material from which no feasible further recovery was indicated at the time. The plus 8 mesh material was planned to go to rod mills for cracking up and thence to adequate jig flows. More will be said about this later.

In the final plant set up a complete reversal of this plan was put into effect - the complete significance of the plan of primary jigs ahead of the screens and the re-jigging of the minus 8 mesh material, after preparing it for a more thorough job of jigging, for the fine gold, was missed entirely. The primary jigs were eliminated entirely and the screens placed directly after the washing trommel so that the minus 8 mesh material got one pass through the jigs and much of the finer gold was lost. How do we know this ? Much of the finer gold from the minus 8 material was not directly amalgable and the expected amount did not find its way into the ball mill circuit. For a determination of the value of the fine jig residues reliance was placed on an average of a great many inadequate assay determinations and only the loss of amalgable gold was accurately determined but not the total recoverable gold. The master mind of this brilliant simplification of the flow sheet has never been revealed.

(4) Next we come to that collosus known as the hydro-separator. The writer devised the very first one of such devices on the California Mother Lode to slough off fine slimes ahead of vanner concentration - didn't dignify it with the name, however - made it by speeding up an old Dorr Thickener - worked excellent for the purpose it was intended. At Round Mountain its purpose was to dewater and deslime the minus 8 mesh material passing through the screen section- a very dilute feed and subject to severe fluctuations.

The overflow had to be suitable as feed to a 260' thickener which was quite sensitive to overdoses of a plus 100 mesh material and the underflow required elevating to the battery of fine jigs. The original flow sheet showed positive acting Dorr Classifiers for this service which, if properly arranged, would also serve to elevate the sand discharge to the jigs and leave only the hutch products to be elevated. Although not specifically mentioned as one of the operating headaches it is a very safe bet that this was one of them and would have been more serious if the plant had a sustained operation to capacity. The elevation to the jigs of the hydro-separator discharge, a classified sand product, was first attempted by an ingenious device known as a packless pump - later replaced by a bucket elevator. Much of the dewatering advantage was lost at the head of the elevator because of insufficient slope to the launder leading to the distribution point ahead of the jigs where more water than was desirable had to be added to the material to wash it down the launder. This difficulty was greatly aggravated by the high content of heavy granite sand. The final dewatering job on the minus 8 mesh jig residues was accomplished in a second hydro-separator followed by Yuba sand wheels which, apparently, worked quite well except on occasions immediately following a shut down where the slimes were permitted to settle into the sands, creating a sloppy mess until cleared.

(5) The plus 8 mesh material went to a battery of jigs where it received a lick and a promise before being discharged to waste with the other residue products. The only recovery which could be expected from this department, in the absence of cup outs on the jigs, would be accumulations on the jig beds and that portion of the plus 8 mesh product which passed through the jig bed screens - 3/16" openings. This would be relatively small - the contained gold in the bulk of the product was lost. Without the benefit of operating records it would be impossible to make a worthwhile appraisal of this loss. The pilot plant experience would indicate that the loss could have been considerable although the feasibility of its recovery in the face of overburden dilution could only be determined from operating data.

(6) The cleaner jig hutch products which were not readily amalgable were sent to a Ball Mill - Dorr Classifier -Clarke Todd Amalgamator circuit where a recovery of upwards of 90% of the gold was made by amalgamation, after grinding. Pilot plant results indicated that upwards of 12% of the total plant recovery was to be expected from this circuit - which is quite close to that actually attained. The operations in this circuit, although reaching an end result within reasonable distance of the expected, were reported as not being too smooth mechanically. In the first place the flow sheet provided for a dewatering cone ahead of the Dorr Classifier in order that the all important factor of classifier overflow dilution could be controlled. In the actual plant this was deleted - probably to save head room - and the operation suffered from the problem of getting the residues to overflow to waste because of low overflow densities. The slope of the sand return launder to the ball mill scoop box was flattened to save head room and for this reason a proper density could not be maintained in the ball mill because of the need of excessive water in the classifier sand discharge launder. The effects of high dilutions in the mill were many, particularly with the amalgam recovery. Lime was added to the mill as a pulp coagulant - this served to promote some movement of amalgam out of the mill whereas a proper

pulp density would have accomplished this with a higher degree of certainty and saved many other nuisances. This situation, however, is not to be compared in magnitude with the other items brought out in these notes but it contributed its share of troubles, needlessly.

In closing it is well to bring out that the change in mining policy and getting the requisite tonnage into the plant are far more important to the financial success of the operation than the correction of all the other faults combined, although they are also important. With a properly stripped deposit to work on a plant capacity of 10,000 tons per day, would result in a profitable operation. Also it should be noted that, in spite of the irregularities, the recovery has been reported as being 143% of the drill hole results.

ALBERT SILVER