REPORT ON DRILLING PROJECT
ON
PLACER MINING LEASES

WILDHORSE RIVER - LONE MOUNTAIN AREA

FORT STEELE MINING DISTRICT

BRITISH COLUMBIA

PREPARED BY

VEEZAY MINERALS EXPLORATION

CALGARY, ALBERTA

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#### INTRODUCTION

This report covers the churn drilling and sampling program of eight holes to bedrock on a gold placer deposit in the Wildhorse River - Lone Mountain area of the Fort Steele Mining District, British Columbia, Canada. The program was initiated in April, 1963. special hammer drill owned and operated by Becker Drilling of Calgary, Alberta was engaged to drill five holes to bedrock or a depth of one hundred and fifty feet. Mr. C. M. Romanowitz, a consulting engineer specializing in placers, and Mr. O. T. McShane, panner, both of San Francisco, were retained to aid in the supervision of this drilling program. While this drill has several advantages over more conventional equipment, it proved inadequate for the type and depth of gravels encountered in this placer. Consequently, the results of this initial drilling were inconclusive. As meagre as the results were, placer gravels were indicated at widely scattered drilling locations. On conclusion of the program it was evident that a proper test of these gravels could only be attained by using a conventional churn drill with considerable capacity.

The initial program was authorized by an agreement between Charles Newmarch and Richard Hughes of Calgary, Alberta and Jack Perry of Houston, Texas. Because of the unsatisfactory results of this drilling and sampling

program, another drilling program was authorized by Mr. Perry. Veezay Minerals Exploration were instructed to locate and contract for suitable churn drilling equipment and initiate a second program about the first week of May, 1963. A contract was negotiated with Western Water Wells and Hamelin Drilling Ltd. of Langley, B.C. for a program of drilling not less than six hundred and fifty feet of eight inch hole. The first hole in this series (No.6) was spudded in at 8:00 AM May 7, 1963. Drilling and sampling were continued until the initial five hole program was completed. Authorization for an additional three holes was granted and the entire program was finished on July 6, 1963. A total of 1,057 feet of eight inch hole was drilled, sampled every five feet and the concentrate panned from each sampled section.

#### HISTORY

Gold was first found on Wildhorse River in 1863.
Concentrated efforts by companies and individuals resulted in the working of a considerable quantity of gravel, principally on two sections of the river.
Hydraulicing was the most used method for handling large quantities of gravel and the remnant "old workings" of today indicate that a considerable quantity of gravel was moved by this method. The last hydraulicing operations were carried on in 1935. With the exception of some exploratory work by small companies and individuals, little work has been done in the area since that time. Despite this, placer leases still cover the Wildhorse River from its mouth up to and beyond the old workings. These leases are maintained in good standing.

In the general area of Wildhorse River considerable prospecting, pitting and even some shaft sinking have been done in the early days and recent years. A two-compartment shaft on Mause Creek is reported to have been reactivated this summer (1963), and a dragline is working the old workings of the Wildhorse.

The area of the leases described in this report has never been tested and can be rightly considered virgin territory. Investigations by Messrs. Newmarch and Hughes indicated the presence of an old channel of Wildhorse River. The results of some test-pitting,

seismic and magnetometer work combined with photogeologic interpretation further substantiated the presence of a channel. A drilling program was instigated in April 1963. Although results were inconclusive, sufficient information was obtained to warrant the initiation of a further drilling program making use of a churn drill. This latter program is the subject of this report.

#### ACCESSIBILITY

The area in which the various placer leases are located is readily accessible from the paved highway through Fort Steele and by good gravel roads. One of these roads traverses the length of all placer leases in a general northwest direction from Horseshoe Lake to Wildhorse River (See air photomosaic, Fig. 3)

Railroad facilities are available as close as Fort Steele, and rail facilities for handling heavy equipment are available at Cranbrook, B.C. Daily air service between Vancouver, B.C., Cranbrook, B.C. and Calgary, Alberta are maintained by Canadian Pacific Airlines. From the standpoint of accessibility, the area can be classed as ideal.

#### LOCATION OF LEASES

In all, twenty-one placer mining leases have been staked in an area that lies between Horsehoe Lake to the southeast and Wildhorse River to the northwest. This trench lies on a line lying close to the mountain front from Lone Mountain at Wildhorse Creek southeast to Horseshoe Lake. Procedures of the British Columbia, Department of Mines were followed in the staking and subsequent recording of the placer leases.

#### POWER, WATER AND TIMBER

Electric power is available a few miles from the location. Numerous old logging roads throughout the area would provide readily useable access lines. Adequate water supply to support any size operation is available

from the Wildhorse River. In addition, the drilling program indicated that water bearing gravels exist at about a depth of 80 feet in the deeper parts of the placer. Western Water Wells drillers estimate that a well in this gravel could produce at a very high rate. Once a dredging operating had reached the water table it probably would not be necessary to bring any water in from Wildhorse River. In any event, adequate water supply is available and could be conveyed to the property at small cost.

For all practical purposes the available timber on the leases would be suitable for the many uses it might be put to in any type of operation. Rough and finished lumber is available from mills at Cranbrook and vicinity.

#### GEOLOGY

The bedrock geology of the area has been studied by C.B. Leech of the Department of Mines and Technical Surveys and reported in Geological Survey of Canada, Paper 58-10, "Fernie Map Area, West Half, British Columbia", Ottawa, 1958. On and adjacent to the leases are outcrops of the Creston formation of Precambrian age. The Creston formation is an argillaceous quartzite of varying shades of white, grey, green and purple. The formation strikes approximately east-west and dips to the north varying from 30° to 45°. Bedrock cut in the churn drill test holes was, for the most part, a grey-green argillite with some local dark grey to black argillite.

A geological report on Placer Leases Nos. 922, 926, 929 and 930 in the Fort Steele area by Charles B. Newmarch and Richard L. Hughes, December 14, 1962, covers in some detail the geologic picture of the lease area and summarizes the results of a seismic and magnetometer survey conducted in 1962. The churn drilling program has substantiated many assumptions on subsurface conditions made in the above report.

A survey of the Wildhorse River channel above and below the old workings was made. A representative section was measured accurately at about the same locality as that referred to in the above report. The notch or channel measured two hundred and seventy feet across and sixty feet in height. A terrace on a gentle slope from 50 to 100 feet wide extends from the shoulder of the notch

to the varying slope of the bedrock ridges on either side of the river. The location of this representative section is indicated on the topographic map of the area (Fig. 1), and a cross-section view taken from field notes of C. B. Newmarch is displayed in Fig. 4.

During the course of rocking the samples collected in this drilling program the various materials penetrated by the drill were closely examined and the conclusions reached by C. B. Newmarch and R. L. Hughes in their report concerning the nature and type of gravel were substantiated. During the progress of the drilling several visits were made to the old workings and as far upstream as the east fork of the Wildhorse River to further check the gravels and present stream conditions. The results of these surveys confirmed the conclusion reached from the drilling program and further substantiated the conclusions of the above mentioned geologic report.

It appears that the old channel of the Wildhorse River lies within the boundaries of placer leases 922, 826, 830 and 929. The channel probably extends to the southeast in the direction of Horseshoe Lake, but this interpretation could be confirmed only by additional detailed geophysical surveys and/or drilling.

#### PREVIOUS WORK

The area under consideration has never been explored by drilling, shaft sinking or pitting before the present leases were staked. To the north of the boundary of PML #922 some evidence exists of small pits having been dug many years ago. Similarly, in the Mause Creek area to the east of PML Angus and up Mause Creek some pitting and shaft work has been done. The results of this work are known only to the extent of local gossip.

Prior to the drilling program of this report considerable work was done by C.B. Newmarch, R. L. Hughes et al, and their report provides details of their prospecting. The drilling program carried out by Becker Drilling in April, 1963 has been assessed in separate reports by Romanowitz and McShane that were referred to previously. It was on their recommendation and the Newmarch-Hughes-Perry groups assessment of the results of this drilling, that the churn drill program was initiated in May, 1963.

#### CHURN DRILLING PROGRAM

#### TABLE I

DRILL: Bucyrus - Erie 24-W Cable Tool Rig (1000°)

CASING: 8 inch, used, weld joint 3/8" (about)

SHOES: 9 - 5" O.D. extra heavy (after failure of

regular shoes)

BITS: 450# and 300# weld build-up Std. Cable tool.

BAILERS: 1 - suction and 1 - dart

WATER TANK: 400 gallon capacity

PUMP: Boyles Bros. B.B. 4-7 No. 49-185A

Size 2x2 G.P.H. 700 RPM 275

TUBS: (Sample) Galvanized Iron 18 1/4" x 11" (high)

9.5 Imp. Gals.

DRUMS: (Sample) 45 Imp. gallon. steel

ROCKER: B.C. Dept. of Mines Model (small) plywood

construction

PANS: Standard

CONCENTRATE VIALS: Standard well-site plastic in trays

See photographs.

The essential equipment used on the project is listed in Table I above. The rig had adequate capacity, and though, like all cable tool rigs, very slow, made satisfactory drilling progress. A total of 1,057 feet was drilled over a total drilling-driving casing and bailing time of 651 hours, or an overall drilling rate of 1.62 feet per hour. In bouldery gravel of this type, that rate of penetration can be considered good. A total of 39 hours was lost on fishing jobs and three days on repairs to equipment.

## CHURN DRILLING PROGRAM

Water for drilling and rocking was supplied from a 400-gallon tank mounted on a truck. Two or three trips per day were required to keep up with the rocking.

Drilling was carried out in the usual manner for gravels: driving casing, drilling and bailing. In the loose well-washed water-bearing gravel it was only necessary to bail and drive.

Samples were collected every five feet mainly for ease of handling and to keep a close check on sampling procedure as laid down to the drilling crews. Bails were dumped first into a cleaned 45-gallon drum until the five foot interval was completed. Excess water was decanted as necessary, then the sample was transferred to the galvanized tubs, labelled, and placed close to the rocker. From these tubs the gravel was shoveled into the dumpbox and the entire sample passed through the rocker. A cleanup of the rocker was made after each sample and the cleanup material panned to a reasonably clean concentrate. this stage colors were separated out from the concentrate and counted. Thereupon the entire concentrate containing all colors was placed in a labeled plastic vial. final concentrate samples were sent to Calgary and assays made of the intervals chosen from the sections containing the better values. On the first lot of concentrates all samples were assayed. In addition, a semi-quantitative spectrographic analysis was made of a representative concentrate. The results of these assays are part of this report and are appended. (See Appendix 1) Logs of all holes drilled are also part of this report and are appended (See Appendix 2)

The location of all holes drilled, including the Becker drilling, are shown on Fig. 1., the topographic map, and in more detail on Fig. 2., the Location Plan. Both maps accompany this report.

It is evident from the results of the drilling program that a pay zone exists in the deposit between holes 6B and 8. It is also evident that values and thickness of pay zone increases from 6B toward hole number 8, the pay zone in 6B being 15 feet thick, that in number 7 being 40 feet thick and in hole number 8 being 45, possibly 50 feet thick. Because most of the colors seen in this drilling program were all approximately the same size (with a few exceptions), it is assumed that all colors are of the same fineness. Values per cubic yard for intervals not assayed in these holes are calculated on a factor established from the assay returns on holes 6B, 7 and 8. For all practical purposes, values under \$0.10 per cubic yard may be eliminated as uneconomic. However, it must be borne in mind that as small as these values may be, their recovery from a large tonnage stripping operation would go a long way toward reducing the cost of such stripping. Table II lists the pertinent data concerning all holes drilled.

It can be readily seen from the value per cubic yard column that the upper gravel contains a fairly consistent distribution of uneconomic gold values, while the lower Tertiary gravel has a fairly wide pay streak that apparently increases in thickness and in values from east to west. See Fig. 5.

# TABLE II

Hole No.	Depth T.D. Bdrk	Water Vis. Gold	No. Clrs.	Rel Val /cu.yd. Cents	Remarks
6	60 Not Reached	35 = 40 40 = 45 45 = 50 50 = 55 55 = 60	2 2 & 5 ml nug 1	Negligible " " " "	Casing broke hole abnded
6 (a)	7		æ	æ	hole abnded
6 (b)	160 149	70	3 6 4+ 2 · vs 1 1 2 2 2 1 1 · vs 2 2 1 21+ 30+ 15+ 4 2	3.3 2.4 7.07 0.28 0.18 0.97 0.04 0.26 0.75 0.50 0.09 0.04 1.07 1.36 21.90 31.90 17.20 0.15 0.09 8.10	Note: how values were calculated to establish index
7	175 Not Reached Estimated at 148'	85	1 1 1 5 1 1 (?) 2 1 vs 4 1 ? 1 ? 3 7 6+ 25+ 5+ 20+ 17 21+ 33+ 68+ 30+ 4 5	Negligible  "" "" "" "" "" "" "" "" "" "" "" "" "	estimate bedrk at 148 on basis of grey mud return. Values and gravel probably wash- in under casing  Estimated Estimated Pay zone "" "" "" Estimated Estimated Estimated

		Depth					10
le o.		Bdrk	Water	Vis. Gold	No. Clrs.	Rel Val. /cu.yd. Cents	Remarks
8	175	171	101	25 = 30 35 = 40 40 = 45 50 = 55 60 = 65 100 = 105 115 = 120 120 = 125 125 = 130 130 = 135 135 = 140 140 = 145 145 = 150 150 = 155 165 = 170 170 = 175	3 1 1 1 1 6 8+ 11 7+ 9 55+ 19+ 38+ 70+ 100+ 110+ 46+ 48 25+ 9	Negligble  " 4.0 5.5 8.0 4.0 5.0 28.3 16.8 36.9 124.0 139.5 175.2 68.0 161.0 21.9 5.0	Estimated Estimated Estimated Estimated Estimated Pay zone "" large flakes Pay zone "" large flakes Pay zone Estimated
9	59	53	None	35 = 40 40 = 45	2 1	* NO ASSAY CON NECESSARY AS	
.0	147	138	88	70 = 80 100 = 105	1: 1	COUNT TOO LO	
.1	118	104	90	50-55 75-80 85-90 95-100 100-104	1 4 1 6+ 2		Static water level 70'aft 8 hrs.shutdo
12	74	71	None	40 = 45 45 = 50 50 = 55 60 = 65 65 = 70	2 5 4 1 2		
13	95	79	None	15 = 20 35 = 40 40 = 45 45 = 50 50 = 55 55 = 60 65 = 70 70 = 75	1 1 2 1 3 2 2 1		

Depth to bedrock as indicated by seismic mapping and as actually found in the drilling program are in fair agreement, considering the empirical character of some of the seismic calculations. Fig. 5. Drilling results and seismic data indicate a fairly steep notch on the west side of the major channel in the immediate area of the seismic line. That is, a deeper notch with gravel filled terraces on either side. Thus, holes 9, 11, 12 and 13 were all located on a terrace close to the deep notch encountered in 6B, 7 and 8. The only really anomalous hole was number 10, on the magnetic high. While considerable amounts of shiny crystalline magnetite were recovered from this hole, very little in gold values was evident.

Holes drilled in both programs were laid out in such a way as to be useful if further drilling were done. Thus, while the most northerly holes did not get into the notch, the values obtained and the nature of the gravels penetrated make it a reasonably safe assumption that the notch exists to the east of the drilling. Therefore, one may assume that the values shown in the notch at hole 8 would be consistent for a distance of one quarter mile northwest and one quarter mile southeast of the seismic line. An idealized section (Fig.6) is the basis for the following calculations:

Total volume of gravel for 1/2 mile length

= 
$$140 \times 30 \times 2640$$
 = 3,736,300 cu. yds.

Volume of pay zone for 1/2 mile length

= 
$$\frac{165 \times 45 \times 2640}{27}$$
 =  $726,000 \text{ cu.yds.}$ 

At \$1.00 / cu. yd. (conservative estimate)

=\$726.000.00 recoverable

Estimated cost moving gravel

= 15 ¢ / yd. x 3.736.300

**\$560,445.00** 

Gross profit from 1/2 mile operation

**=**\$726.000.00 **-**\$560.445.00

=\$165,000.00 Gross Profit

Because of favourable accessibility, the nature of the gravel, the easy access to adequate water supply and almost ideal topographic conditions, the cost of moving gravel in this area could be considerably less than 15¢ per yard. If ultimate cost of 10¢ per yard is assumed, then the above gross profit figures become:

\$ 726,000.00 - \$373,630.00

\$ 352,370.00 GROSS PROFIT

Further extension of the paystreak in the notch, as outlined on Fig. 1, would provide millions of yards of gravel that could be treated in a similar manner, and if returns from the program as outlined above were sufficiently promising, the possibility of dredging should be more closely examined.

The results of work done so far on this placer point to the possibility of a reasonably large buried, comparatively high grade deposit, the Assay results of holes 6B, 7 and 8 substantiate this interpretation.

### CONCLUSIONS

The drilling program has demonstrated the existence of an old channel of the Wildhorse River that contains placer gold in apparent economic quantity. The pay streak is located deep in the placer close to bedrock. While an economic section of placer gravel has been proven only at one location it is reasonable to assume that the channel, when finally mapped by further work, will contain a sufficient volume of pay to make a commercial placer.

The cost of removal of the excessive thickness of "low grade" gravel above the pay streak would be partly compensated for if the gold values contained therein were recovered.

Several ways of mining a placer deposit of this type exist. The cheapest would be to acquire the property to the northwest, that is placer mining leases 837 and 838, and initiate hydrauliking from some point close to the Wildhorse River. The removed gravel could be washed back to the Wildhorse River by means of bedrock trenches cut in the reverse slope of the old channel. This procedure would

with work would

provide a relatively cheap and efficient way of evaluating the deposit and at the same time enable the operation to assess the economics of complete or partial removal of low grade material. It is estimated that an investment of a few tens of thousands of dollars would provide sufficient funds to advance such a project from the initial start, close to the Wildhorse River, at least up to the position of the line of holes containing nos. 5B, 7 and 8.

Another technique would consist of sinking a shaft at the location of hole No. 8 and attempt to drift-mine the pay streak from the bottom of this shaft on bedrock. Some difficulty would be experienced in trying to penetrate the water-bearing gravel. Further, shafts of any size in loose gravel are costly. It is doubtful if the water problem could be easily overcome because drilling results indicate that the water bearing gravel is extensive and contains a considerable volume of water. Some form of tubbing and combined grouting would be essential. This can be a very costly procedure. However, water problems are not insurmountable with modern pumping equipment and the utilization of chemical grouting compounds.

The possibility of dredging should not be overlooked. This method would entail the outlay of considerable capital in equipment and could not be justified until a detailed drilling program and economic evaluation has been completed. It is estimated that such an evaluation program would entail the drilling and sampling of many more holes and in itself be more costly than the sluicing program as outlined.

#### RECOMMENDATIONS

It is recommended that the results of this drilling program be reviewed with a competent geophysical firm with the object of reassessing previous geophysical (seismic and magnetometer) results. This study should lead to the preparation of a geophysical program of sufficient detail to delineate the deep channel in which the economic pay streak exists. We have been assured by Mr. R. Grier of Velocity Surveys Ltd., Calgary, that this delineation is entirely feasible, and could be accomplished at a very moderate cost.

Upon completion of the geophysical program it would be adviseable to select a few drilling locations. These holes should be located so as to intersect the deepest portions of the channel. If "sweeps" or meanders in the old stream bed are found, the holes should be located as nearly as possible to the center of the outside sweep of these meanders.

The evaluation of these holes along the length of the deposit, combined with the results of the drilling program of this report would provide sufficient data to devise a mining method that would provide a means of working the deposit at a reasonable profit.

### ACKNOWLEDGEMENT

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Angus G. MacKenzie, P. Eng.

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