412

GEOPHYSICAL-GEOLOGICAL SURVEY
of
SPECIAL PLACER MINING LEASE # MR44805D
PERRY CREEK, CRANBROOK, B.C. AREA

FORT STEELE MINING DISTRICT

for

H. R. MORRIS
CALGARY, Alberta

October 1961

49° 115° NW

82G/12W

WM. HOWARD MYERS, P.ENG.

GEOPHYSICAL-GEOLOGICAL SURVEY
SPECIAL PLACER MINING LEASE # MR44805D
PERRY CREEK, ALTA.

INTRODUCTION

At the request of Mr. H.R. Morris of Morris & Morris, Mineral Exploration Consultants of Calgary, a seismic refraction survey was carried out on Special Placer Mining Lease #MR44805D, located on Perry Creek in the Cranbrook area of British Columbia. The object of the survey was to obtain elevations on bed rock throughout the general area of Perry Creek. It was felt that Perry Creek occupied a different channel in pre-glacial times and the refraction survey was designed to locate this "old channel" which it was successful in doing. The location of the refraction work together with the results are shown on the enclosed maps.

The seismic refraction survey was carried out during the period from May 11th to July 1st, 1961. Some 24 days were spent in the field conducting the survey. An additional 5 days work were required to compute and draft up the results of the survey.

The survey was carried out using the Dyna Metric Model 117 Seismic Timer Unit. The unit is manufactured by Dyna Metric Inc. of Pasadena, California, and consists of the Seismic Timer instrument which measures the velocities of seismic shock waves, two geophones, 8-lb. sledge with impact switch and striking plate and electrical cable. The unit is operated by two men, one operating the instrument and the other producing the shock wave at various positions on the spread. Arrival times of the various shock waves are read directly in Milliseconds and plated on a time distance graph.

An average spread length of 160 feet was used with station spacing of 10 feet. At each setup a reversed refraction profile was obtained by recording shock arrival times at both ends of the spread. The reversed profile gives additional detail information on the various velocity layers as well as enabling the operator to compute dip on the various interphases. In some instances where bed rock was quite deep a longer spread up to 320 feet was used to obtain deeper penetration. The depth of penetration of course depends upon velocity and spread length but in general a spread length of 160 feet gave good bed rock depth determinations.

The reversed refraction profiles were in general located along a road or trail where the spread could be laid out in a straight line and there was not too much elevation change over the length of the profile. In the more critical areas however the spread or profile was run through the bush or undergrowth. In these areas considerable more time was required to obtain the data because this area has a thick growth of brush.

After the location of a profile was made the 160 foot spread was divided into 10 foot intervals. A geophone was placed on both ends of the spread which gave a reversed profile by simply flipping a switch and striking the plate again. To get an accurate check on the arrival time of the shock wave from each station several readings were required from each station. An average of three readings were taken from each station in each direction. This required the striking of the plate 6 times at each station or approximately 96 times on the profile. Approximately seventy reversed profiles were run during the survey.

The surface elevations at each profile were determined from a plane table survey which tied in all the stations north of the present Perry Creek. The surface elevation together with bed rock elevation at each profile are shown on the enclosed maps. The profiles south of Perry Creek were not surveyed in with the plane table because the results obtained on the profiles were not favourable for further testing. The profiles in this area were plotted on the map made from aerial photographs and surface elevations between profiles was determined by hand level.

The shock wave arrival times from each station were read direct in milliseconds on the seismic timer. The average time from each station was then plotted on a time distance graph. In most cases the readings would repeat within ± Millisecond. When these times were plotted for all stations on the profile a straight line was then drawn through those points which lined up. For each straight section of the graph a velocity was obtained by dividing the total measured distance by the total measured time. The flatter the graph the higher the velocity. On some of the profiles as many as three different velocity layers were recorded. On some profiles there was only one interphase recorded. Near surface velocities varied from 1000 to 1400 feet per second with an average of about 1100 feet per second. The average thickness of this near surface velocity layer was approximately 12 feet and normally represents glacial drift. When a thicker layer was recorded a higher velocity was also obtained and probably represented the inclusion of part of a higher velocity layer but with no definite break. On a number of profiles an intermediate velocity layer was obtained which varied from 2200 to 4500 feet per second. The average velocity in this layer is about 3200 feet per second. This layer denotes clean gravels and reworked drift material. The higher velocities probably represent the inclusion of a higher velocity bed below but without a definite break on the graph. Bedrock velocities varied considerably throughout the area. This was expected due to the difference in bed rock composition and depth of weathering. Known bed rock velocities varied from 5700 to 17,000 feet per second. The average bed rock velocity obtained throughout the area was approximately 11,000 feet per second. In most cases a sharp velocity break could be picked at the top of the bed rock. The depth to bed rock north of Perry Creek varied from 8 to 99 feet. The depth to bed rock at each profile is shown on the enclosed map.

Depth computation to the various velocity interphases and bed rock was computed by the use of the formula $D_1 = \frac{L1}{2}\sqrt{\frac{V2 - V1}{V2 + V1}}$ where there was more than one interphase or layer the formula was expanded to

$$D_2 = D_1 + \frac{L2}{2} \sqrt{\frac{V_3 - V_2}{V_3 + V_2}} - D_1 \; R.$$

In computing the dip on an interphase the following formula was used Dip $\theta = 1/2$ $(\sin^{-1}\frac{(V1)}{(V2)} - \sin^{-1}\frac{(V1)}{(V2)}$. The depth to a dipping horizon was computed

from the formula $\frac{L}{2} \times \frac{1 - \sin(a \overset{+}{-} \theta)}{(\cos a)(\cos \theta)}$, $\sin a = \frac{2\,V1}{V2' + V_2}$ "

By substituting in the above formulas the values obtained from the time-distance graph the various depths were readily computed.

D_1	=	Depth to interphase
D_2	=	Depth to second interphase
L_1	=	Distance on graph to where velocity breaks
L_2	=	Distance on graph where second velocity breaks
V_1	=	Velocity in feet per seconds of first layer
V_2	=	Velocity in feet per seconds of second layer
V_3	=	Velocity in feet per seconds of third layer
V_4	=	Velocity in feet per seconds of fourth layer

To aid in identifying the material represented by the various velocity layers a velocity profile was run over known or exposed material. In a dry mixture of sand and small gravel a velocity of approximately 2000 feet per second was obtained. It is estimated that this same material when wet would have a velocity near 4000 feet per second or perhaps a little higher. A variation in velocity would also be due to composition of the matrix or cleanness of sand and gravel. Known glacial drift material which was not too well sorted gave a velocity of about 1500 to 1700 feet per second. A bed rock velocity of 7500 feet per second was obtained on a medium weathered schistose type rock. Bed rock composed of highly limy material is present in this area but no direct velocity determination was made of this type bed rock. No doubt some of the bed rock velocities around 12,000 feet per second were of this composition.

RESULTS

The quality and continuity of the data obtained from the refraction seismic survey are considered good and reliable. After a detailed study and an overall correlation of the various velocity layers it is possible to identify the material making up these various layers. This analysis made it possible to identify such materials as glacial drift, small gravel and sand deposits, large gravel or boulders fairly free of small gravel and sand, gravel with clay and sand infilling and bed rock with various degrees of weathering.

CONCLUSIONS

The results of the refraction work indicates the existence of an old channel which Perry Creek probably occupied in part during Tertiary times or pre-glaciation. The general outline of this channel is shown on the enclosed map and is located north of the present channel. It is very possible that the old channel continued to flow more northerly and emptied into the St. Mary's River several miles north west of the present confluence. It is also possible that the old channel outlined by the refraction work is part of a meander of the old creek and it may turn east and enter back into present channel near the St. Mary's River.

The elevation of bed rock in the old channel is considerably lower than the elevation of the bed rock in the present creek bed. There appears to have been as much as 30 to 40 feet of down cutting in this older channel below the level of glacial erosion. The channel appears to have been partially filled with glacial drift. Some Tertiary gravels or gravels deposited during the cutting of the old channel were found in a pit which was later excavated into the old channel. The grade of the old channel is approximately 70 feet per mile, rising toward the upstream side of Perry Creek where as the present stream gradient at this point is in the order of 50' per mile.

It is recommended that further testing be carried out on the gravels in the old channel as outlined by the refraction seismic work. There is sufficient control from the refraction work to locate favourable placer traps in these old gravels.

Respectfully Submitted,

Wm. Howard Myers, P. Geol
Geophysical-Geological Consultant.

W. Howard Myers
Geophysical Consultant
Calgary, Alberta

508 Lancaster Bldg.,
Calgary, Alberta.

March 1962.

CURRICULUM VITAE
Wm. Howard Myers, P. Geol.

Education

Fresno State College, Fresno, California, 1934-1939
Graduated 1939 with honors
A.B. in Geology.

Stanford University, Palo Alto, California 1939 - 1941
Completed requirements (field work) for B.S. Degree in Geology from Stanford.
Graduate work for M.S. Degree.

Professional Societies

Member - Association of Professional Engineers of Alberta
Member - Society of Exploration Geophysicists
Member - American Association of Petroleum Geologists
Member - Canadian Institute of Mining & Metallurgy
Member - Alberta Society of Exploration Geophysicists
Member - Alberta Society of Petroleum Geologists

Experience

Consulting Geologist and Geophysicist 1952 - Present
Geological and geophysical exploration work for oil and mining in Canada and foreign countries. Property evaluation, general exploration using all geophysical methods, geological field work and research. Specializing in a geological interpretation of geophysical data.

Chief Geophysicist of Union Oil of California 1951 - 1952
The supervision of all geophysical exploration work in Canada for the Company. Correlation or coordination of geology and geophysics. Also administration work.

CURRICULUM VITAE Cont*d

Geophysicist & Executive for United Geophysical Co. Inc. 1942 - 1951
The supervision of geophysical exploration for oil all over the world. A limited amount of geophysical exploration for mining also. Some administrative work for the company also. The work also involved a correlation of the geology and geophysical data especially in foreign countried.

Geologist for United States Geological Survey 1941 - 1942
Detail geological mapping of various mineral deposits in the western United States, Alaska, Mexico and Cuba. Mine examinations were also made and exploration programs laid out for further testing for ore bodies.

Student at University 1934 - 1941.

508 Lancaster Bldg.,
Calgary, Alberta.

April 3, 1962.

Mr. H. R. Morris,
Morris & Morris Mineral Consultants,
Blow Building,
CALGARY, ALBERTA.

Dear Mr. Morris:

Re: Expenditures for Seismic Work and Prospection
Ore S.P.M.L. No. MR 44805 D

The following is a revision of the breakdown on the seismic work portion of the above. As set forth in the letter from the Gold Commissioner, only one professional man at $35.00 per day will be allowed on the seismic work.

Date	Days for Professional Man	Days for Non-Tech. Man
May 11-17 incl.	7	7
June 1-6 incl.	6	6
June 20-July 1 incl.	11	11
July 10-July 14 incl.	5	-
Total	29 days	24 days

29 days @ $35.00/day -	$1,015.00
24 days @ $15.00/day -	360.00
Instrument Rental	375.00
Total	$1,750.00

Fifteen dollars per day was used for the non-technical man as this was the going rate in the area.

In addition to this work, the following expenses were incurred in excavating two pits on the old channel.

Dragline Rental, Murray Lumber, Cranbrook	$669.00
Back Hoe Rental, Otto Tomm, Cranbrook	209.00
Pump Rental Wes Earl, Cranbrook	30.00

Truck Rental, Bel Air Service, Cranbrook	30.99
Trucking, Walter Russel, Cranbrook	291.16
Total	$1,230.15

I trust that the breakdown and total of the two expenditures will be sufficient for your needs.

Sincerely yours,

Wm. Howard Myers, P. Geol.
Geophysical-Geological Consultant.

WHM/McG


(M1)
Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 412 MAP 1
Final Post
PERRY CREEK
To Cranbrook
Staples Creek
SLOUGH
S.P.M.L. No. MR44805D
Post #3
#2 Post
Initial Post
24° Mag. Decl.
3130
3140
3150
3160
3170
3180
3190
3200
3210
3220
3230
3240
REFRACTION SEISMIC SURVEY
SPECIAL PLACER MINING LEASE
No. MR44805D
PERRY CREEK AREA
Cranbrook, B.C.
SCALE : 1" = 200'
CONTOUR INTERVAL : 10 feet
(Contours on bedrock)
Wm HOWARD MYERS P. Geol.
Geophysical - Geological Consultant
NOVEMBER, 1961
-LEGEND-
Refraction Profile Location and No.
#8
V1 = 1000
V2 = 1600
V3 = 7200
D1 = 20'
D2 = 45'
V1 = 1000
V2 = 1500
V3 = 7600
V1 = Velocity 1st layer feet per second
V2 = Velocity 2nd layer feet per second
V3 = Velocity 3rd layer feet per second
D1 = Depth to V1 - V2 interphase
D2 = Depth to V2 - V3 interphase
D2 = 45' Depth to bedrock
Computation Formula
D1 = L1/2 √((V2 - V1)/(V2 + V1))
D2 = D1 + L2/2 √((V3 - V2)/(V3 + V2)) - D1R
412