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REPORT ON
PART OF THE PROPERTY (PEGGY)
Of The

HEDLEY AMALGAMATED GOLD MINES, LIMITED.

Hedley, B. C.

By

A. M. Richmond
Resident Mining Engineer
British Columbia Department of Mines
Penticton, B.C.

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HEDLEY AMALGAMATED GOLD MINES, LIMITED.

Report By

A.M. Richmond,
April, 1936.

INTRODUCTION.

Purpose of the Examination and Report.

Following the appearance of information in the public press to the effect that large tonnages of commercial ore had been indicated at the property of the Hedley Amalgamated Gold Mines, Limited, near Hedley, British Columbia, instructions were received from the Provincial Mineralogist on February 6th, 1936, to make a thorough investigation of conditions at the property, and to determine, as far as possible, the tonnage and grade of the ore existing at the mine so that the aforementioned reports might be checked and, if found inaccurate, the true information could be given to the public by the Minister of Mines.

The information made public through Company and newspaper sources early in 1936 is given in full in Appendixes #1 and #2 attached to the end of this report.

Briefly the salient points of this published information are as follows:

In a summary report to the Directors of the Company on November 6th, 1935, W. S. Bacon, the Company's engineer states:-

(1) "My own conclusion, which I shall present in the near future, is that you have an indicated ore body of at least a half a million tons of commercial ore."

(2) "Originally an outcrop of oxidized ore was drifted on by the original owners. Subsequent development and exploration by cross, winze, and raise indicates that a large tonnage estimated at 35,000 tons of oxidized ore was developed. A careful sampling of this body of ore was indicated confirmed me in the opinion that the values range from \$9 to \$11."

(3) "The interior holes"(DIAMOND DRILL HOLES) "namely, Nos.1 to 9 inclusive disclosed the presence of a large body of commercial ore capable of being mined and milled at a low figure."

(4) "No. 10 hole drilled to 900 feet indicated positively that the ore body had a downward extension over 500 ft."

(5) "The condition disclosed (in No.11 Hole) would indicate in my mind that you can develop an ore body here as significant as your already ascertained one; I am of the opinion that you will find it even larger than the one already indicated by Nos. 1 to 10 drill holes."

In the sheet attached to this summary report by Mr. W.S.Bacon outlining the calculations in connection with the drilling and the ore body it is stated:

"267,400 tons have value @ \$13.44 of \$3,593,856"

"269,500 tons have value @ 6.90 of 1,859,550"

"478,100 tons have value @ 3.75 of 1,792,875"

"1,015,000 tons \$7,246,281"

The above figures, it is further stated, "do not take into consideration any ore outside the actual area drilled."

The Vancouver News Herald on January 13th, 1936, contained an article written from a progress report issued by the Company and it contained amongst others the following statements:

(1) "An indicated orebody of at least 500,000 tons of commercial ore is estimated by W.S.Bacon, M.E., engineer for Hedley Amalgamated Gold Mines, Limited."

(2) "The first 200 feet driven" (RED TUNNEL ADIT) "resulted in the blocking out of 35,000 tons of \$12 ore with an additional 19,000 tons of similar ore on the dump".

(3) "As the Red Tunnel was extended further it opened up another orebody 250 feet long and $6\frac{1}{2}$ feet wide, with an average ore value of \$12." (N.B. The values for gold only are taken at \$34 per fine ounce. See Appendix #3.)

(4) "At the time this ore was first developed, Mr. Bacon stated that if this body extended to a depth of 150 feet, a profitable mine of good size could be assured. Since that date through further development and through diamond drilling of 11 holes, all of which penetrated the ore, this large orebody, in the shape of a funnel, has been proven to a depth of about 700 feet. To the east of this orebody and parallel to it, diamond drilling proved an ore condition analagous to that obtaining in the main body."

With a view to determining the correctness of the above statements the Resident Mining Engineer spent nine days at the property between February 13th and 26th, 1936, checking the underground work at the Red Tunnel adit,

mapping the geology, sampling the mineral exposures, and carefully examining and sampling the diamond drill core remains. On the basis of the information so gathered, and by the further study of the core samples megascopically and microscopically in the laboratory of the Department of Mines, at Victoria, the following report, conclusions, observations and recommendations is respectfully submitted.

PROPERTY AND OWNERSHIP.

The Hedley Amalgamated Gold Mines, Limited, own or have under option 23 mining claims and one mill site at Hedley, British Columbia, in the Similkameen Mining Division of the No.4 Mineral Survey District. Seventeen of the claims have been surveyed and the mill site location near the Similkameen river and the tracks of the Great Northern Railway, are shown on Map HA-1, which accompanies this report. Six of the claims are recent locations, not yet surveyed, and they are situated to the northeast of the Billy Goat No.1 and Billy Goat No.2 mineral claims and to the northeast of Twenty Mile creek.

The mining claims have a total area of about 950 acres; the mill site has an area of approximately

30 acres. The complete list of surveyed mineral claims is as follows: Billy Goat No.1, Billy Goat No.2, Atlas Fraction, N.S., Butte, Joan Fraction, Jumbo, Cyclone, Whirlwind, Melva, Ruby, Roddy, Bull Dog Fraction, War Eagle, Blue Grouse, Mul^e Deer, and Ridge Fraction.

The Hedley Amalgamated Gold Mines, Limited, is capitalized at \$1,500,000 with 3,000,000 shares of 50 cents par value. The registered office of the Company is 736 Granville Street, Vancouver, B.C., and the officers of the Company are: Alfred Thompson, M.D., President; Russel E. Barker, Vice-President; Frank Parsons, Secretary-Treasurer; Directors, J.Y.McCarter, J.E.Buerk, R.Swanson, and John A.Robinson.

LOCATION OF THE PROPERTY.

The claims above mentioned are situated on the sides and summit of Stemwinder mountain, approximately one mile northwest of the town of Hedley. Hedley is a well known mining community on the Great Northern railway as it is here that the Nickle Plate mine, once the largest gold mine in Canada, is located. The Latitude is north 49 degrees 20 minutes and the Longitude is 120 degrees 10 minutes west of Greenwich. Stemwinder mountain rises to an elevation of 3950 feet above sea level, or 2250

feet above the level of the Similkameen river at Hedley. The Red Tunnel adit workings are on the south side of the mountain and have a portal elevation of 3756 feet, and the recently opened Ruby Tunnel adit is on the same side of the mountain but 630 feet lower in elevation at 3126 feet above sea level.

ACCESSIBILITY AND TRANSPORTATION.

Access to the Ruby Tunnel adit portals is by a one and one half mile automobile road which leads northward up the slopes of Stemwinder mountain in a series of switchbacks from a point one and one half miles west of Hedley on the Hedley-Princeton highway. A trail, four feet wide, connects the Ruby Tunnel adit with the Red Tunnel adit, and the now deserted mine camp buildings which are situated about half a mile to the north west of the upper adit workings.

Hedley is 18 miles west of Keremeos and 25 miles east of Princeton by automobile road. Penticton, at the south end of the Okanagan lake, is just over 50 miles by road to the northeast from Hedley.

Railway communication for the transportation of freight and mining supplies is either by Great Northern railway from Hedley, or via the Kettle Valley branch line of the Canadian Pacific railway from either Princeton or

Penticton. At the present time the Great Northern railway is petitioning the Board of Railway Commissioners for permission to abandon their railway line running into Hedley, and it is expected that a decision will be rendered by the Board in the very near future.

The Great Northern railway from Oroville, just across the International Boundary, in the United States, permits supplies to be brought in from Wenatchee, Spokane and Seattle, respectively 193, 367, and 347 miles by rail from Hedley. The Great Northern railway from Hedley to Princeton, a distance of 24 miles, is not safe for travel at the present time as several bridges on this section require extensive repairs before they will be safe for traffic.

Princeton, on the Kettle Valley railway, is 182 miles east of Vancouver by rail, and 325 miles west of the smelter owned by the Consolidated Mining and Smelting Company of Canada, at Trail. It is 390 miles from Hedley to the American Smelting and Refining Company's smelter at Tacoma, Washington, over the Great Northern railway lines, or 377 miles to this smelter over the Kettle Valley and connecting United States railway lines.

GENERAL ECONOMICS.

Topography.

Stemwinder mountain with a summit elevation of 3950 feet is of moderate relief as compared to the surrounding mountains of the Hedley area which rise to elevations of 7,000 to 8,000 feet above sea level. The summit of the mountain is gently rounded, covered with several feet of soil overburden, and sustains a semi-arid type of vegetation of wild grasses and flowers. A few pine and fir trees grow on the upper slopes. The northeastern slope of the mountain to Twenty Mile creek is rugged and precipitous, the average slope being about 45 degrees. The southwestern slope of the mountain to the Similkameen river is of more gradual descent, the average slope being 20 to 25 degrees with occasional places where rugged, steeply tilted rock outcrops form bluffs of small to moderate size.

Drainage.

The Similkameen river flowing easterly through a broad, deep, U-shaped, glaciated valley to the south of the property is the main drainage river of the area. It contains ample water for all mining and milling purposes, but due to its comparatively low gradient (19 feet drop to the mile in the vicinity of Hedley) it cannot be used

economically for the development of waterpower.

Twenty Mile creek which flows from the northwest through a narrow, canyon-like gorge between Stemwinder mountain and Lookout mountain to the northeast, has a total length of about 15 miles, and due to the semi-arid climate of the district, it is said to be almost dry in the late summer months of the year.

There are several small springs on Stemwinder mountain towards the summit on the southern slopes, and use is made of these to give the small supply of water at present used in the development operations at the Ruby Tunnel adit.

Climate.

The climate of the district is pleasant and invigorating in the spring and fall months. The summers are usually hot and dry, and in the winter the temperature falls to 25 or 30 below zero for short periods of time. The fall of moisture in the form of rain and snow is always light, averaging about 11 inches annually. The snow usually disappears early in March or April from all but the highest summits.

Timber.

Taken as a whole the area is well, though not

thickly wooded, the principal varieties of trees suitable for mining purposes, both for underground timbering and fuel, are yellow pine, fir, and spruce, with some balsam. On Ste^mwinder mountain there is sufficient timber for mining purposes for some time to come. It is mainly fir and yellow pine, and the best stands are in the vicinity of the Ruby Tunnel adit.

Power.

The 66,000 volt high-tension power line of the West Kootenay Power and Light Company passes across the southern end of the property, approximately 6,000 feet to the southwest from the Red Tunnel adit. This power line was built originally to serve the Copper Mountain mine of the Granby Consolidated Mining, Smelting and Power Company, Limited, 14 miles south of Princeton, but early in 1935 the Power company built a step-down transformer sub-station at Hedley so that power might be supplied to the mines of the Hedley camp. The Hedley Amalgamated Gold Mines, Limited, have recently completed the construction of a three-phase power line, capable of transmitting 250 horsepower at 2300 volts, from the Hedley sub-station to the portal of the Ruby Tunnel adit. Power is taken from the West Kootenay company sub-station at 2300 volts.

General Data.

Labour for mining operations is plentiful in the district due to the fact that there are two mines operating -- the Kelowna Exploration Company, Limited, owners and operators of the famous Nickle Plate mine at Nickle Plate mountain, which they are working at 220 tons daily capacity, and the Hedley Mascot Gold Mines, Limited, who have almost completed the installation of a 150 ton per day capacity mining and milling plant -- and many miners have come into the area seeking work, not all of whom have been successful.

Supplies for mining are obtainable quickly from such centres as Vancouver, Spokane and Seattle, while domestic supplies used by the employees are obtainable at the several general stores in Hedley at prices approximating those prevailing in the larger cities.

The Hedley Amalgamated Gold Mines, Limited, employees were housed and fed at a camp built near the Red Tunnel adit during the time that work was in progress there, but owing to the fact that a good road connects the present working place with the town of Hedley, 3 miles away, it is no longer necessary that the Company provide living quarters for their employees.

HISTORY OF THE DISTRICT AND PROPERTY.

District.

The history of the Hedley mining camp has not been spectacular. The first claims in the area were staked about 1894, but it was not until 3 years later that serious attention was given to the development of the Sunnyside and Nickle Plate ore deposits, and it was not until May, 1904, that mining and milling operations were commenced by the Daly Reduction Company, who had become owners of these two properties by purchasing them from Messers Wollaston and Arundel, the stakers.

The start of actual mining and milling work stimulated prospecting in the district and most of the other claims now in good standing were taken up about this time. The various claim owners expended a considerable amount of time and money in prospecting and developing their holdings but with indifferent results, and the only producing mines were those on Nickle Plate Mountain, and while ore reserves were never large at these mines, they continued working until 1931, and produced over \$11,750,00 in gold. The Nickle Plate mine was brought back into production in 1935 by the Kelowna Exploration Company, Limited, following an extensive

exploration programme, and it is at present being operated at 220 tons per day capacity, with several years ore in sight in the mine.

The Mascot fractional claim was acquired from Mr. Duncan Wood early in 1935, by the Hedley Mascot Gold Mines, Limited, and it is expected that their 150 ton per day mining and milling plant will be in operation by the first of May 1936.

Local History.

The claims forming the nucleus of the ground now held by the Hedley Amalgamated Gold Mines, Limited, were originally staked about 1904, but it was not until nearly 1923 that the owners, Messers. D.H. McKinnon, H. Neil, and J. Walker, of Hedley, (W. Baxter, of Hedley, became a part owner of the claims later) did more than seasonal assessment work on the mineral showings. The claims, then known as the Peggy group, were bonded in 1926 to the Consolidated Mining and Smelting Company of Canada, Limited, and they put down four diamond drill holes to test the continuity of the oxidized mineral showings in the area to the north of the Red Tunnel adit. This Company dropped their option in 1926 and for the next few years only minor prospecting work was done by the owners. The claims were bonded again in 1932, this time to J.S. Graham, of Bellingham, Washington, and some underground work was done in the

Red Tunnel adit workings. The Stemwinder Mountain Mines, Limited, was formed in 1933, and some further work was done in the same workings, the Red Tunnel adit being continued for another 140 feet into the hill in a northeasterly direction. The present company was formed in 1934, and the holdings have been extended considerably since they acquired the Peggy group, both by staking and option agreements. The new company have continued exploration and development by surface trenching, underground development, and diamond drilling to the present time, since they acquired the ground. The recent work has been in charge of W. Cox, as superintendent, and J. Fraser, as foreman.

GEOLOGY OF THE DEPOSIT.

The examination on which this report is based was made at a time when the surface workings were covered with from one to two feet of snow, and as a consequence it was only possible to examine the underground workings and the diamond drill core. The principal underground work has been done on the Whirlwind claim, and it is on this claim that the Company's engineer, W.S. Bacon, states that large tonnages of commercial ore have been located by underground development work and diamond drilling.

The Hedley mining camp was geologically surveyed by Charles Camsell, in 1907 and 1908, the results of his

survey being made public in Memoir No.2, entitled, "The Geology, and Ore Deposits of the Hedley Mining District.", and issued by the Geological Survey of Canada. Further geological work was done in the area in 1926 and 1928, by H.S.Bostock, and his report entitled, "Geology and Ore Deposits of Nickle Plate Mountain." was published by the Geological Survey of Canada in their 1929 Summary Report, Part A.

From a study of these reports the rocks in the area of the Red Tunnel adit workings are known to be a thick series of thin-bedded limestones, argillites, and quartzites, which strike in a northeasterly direction and dip at steep angles to the northwest. These sedimentary rocks have been placed in the Aberdeen formation, of Triassic age. They have been intruded by extremely irregular tongues and dykes of diorite, probably offshoots from the diorite stock which forms the core of Stemwinder mountain.

This diorite stock, according to a surface geological map made by V.Dolmage, and shown to the writer, is found outcropping in contact with the sedimentary rocks 380 feet to the northeast of the Red Tunnel adit portal.

The writer made a geological study of the underground workings, and the general conditions mentioned above, were found to be true of the underground workings. The results of the underground survey are plotted on Maps HA-2, and HA-3.

The sedimentary rocks underground are mostly

thin-bedded, grey to blue limestones, in places highly altered by contact metamorphism, with areas of thin-bedded argillaceous and quartzitic sediments. The sedimentary rocks all have a general north 35 to 40 degree east strike, the dip to the northwest varying from 60 degrees near the Red Tunnel adit portal, to as much as 80 degrees at points close to the contact of the sediments with the diorite stock, exposed in the northeast end of the underground workings. Close to this contact the limestone beds are highly altered and silicified, with garnet and minor amounts of epidote mineralization quite prominent.

The main intrusive rock into the sediments is the diorite stock. The diorite is of medium to coarse grain, its exact composition varying from rocks approaching a gabbro, as in the end of the northeast drift, to rocks of granodiorite composition, as indicated by the diamond drilling. The underground contact of the sediments with the diorite stock corresponds closely in strike and dip with its surface contact as mapped by V. Dolmage. The underground contact is broken by four faults of slight vertical displacement, and has a general north 55 degree west strike and a dip of 80 degrees to the southwest.

From this diorite stock, and possibly from other smaller pipes and stocks of diorite which do not outcrop at the surface or in the underground workings, several irregular

sheet-like tongues and dykes of diorite have, in past geological times, been intruded into the sedimentary rocks. These diorite sheets have a general strike which closely parallels the strike of the enclosing sedimentary formations, but they dip at angles of from 11 to 20 degrees to the northwest, or across the steeper dipping sediments at angles of from 40 to 70 degrees. One narrow vertically dipping diorite dyke cuts across the Red Tunnel adit in a north-south striking direction at a point 228 feet in from the portal. This diorite dyke was also picked up in drilling holes No.2 and No.6. A 15 to 20 foot wide aplite dyke, conforming in strike to the bedding planes of the enclosing sediments, and with a vertical dip across the bedding at slight angles, cuts the Red Tunnel adit 157 feet in from the portal. Two narrow andesite dykes were encountered in the drilling of hole No.10 at depths of 290 and 415 feet below the Red Tunnel adit workings, but they were not found cutting the level.

MINERAL DEPOSITS.

The mineral deposits mentioned in the first part of this report are all contiguous to the Red Tunnel adit workings. Three and possibly four different types of mineral occurrence have been noted, although all have

similar mineral associations they occur in somewhat different ways.

The first type is the oxidized pyrrhotite, pyrite and arsenopyrite replacement zones and fracture fillings which overly and contact the flat dipping hanging wall of the diorite sheets which are intrusive into the sediments. This type is best developed in the so called "Oxidized Orebody" which is exposed in the first 154 feet of the Red Tunnel adit, and northeast from its portal, and in the 70 foot raise driven south 70 degrees east upwards at from 11 to 14 degrees along the hanging wall of the diorite sheet at a point 90 feet in from the adit portal. A 30 foot winze to the northwest from a point 115 feet from the adit portal follows the diorite sheet down a dip of 18 to 20 degrees for 15 feet at which point the diorite sheet either ends abruptly, or steepens in dip and is lost in the footwall rocks of the winze. The mineralization in this winze pinches to a narrow fracture just below the point at which the diorite disappears, although continuing across the dip of the enclosing limestone rocks at an angle of dip similar to that disclosed in the flat raise mentioned above.

The mineralization in the oxidized zone varies from 6 to 79 inches in width, averaging just over 4 feet. At the time the diorite was intruded the limestone for a short distance above the hanging wall of the diorite tongue

was fractured and sheared in planes paralleling the diorite, thus providing access for the ore bearing mineral solutions, which are considered to have originated in the cooling diorite magma. After the sulphide mineral bearing solutions had been deposited in these fractures, and had replaced the limestone rocks for a short distance above the diorite hanging wall they were attacked by surface solutions which largely altered them to limonite, producing the present oxidized mineral zone. The mineralization consists of layers of soft limonite separated by layers of unoxidized minerals consisting of silicified limestone, argillite impregnated with pyrite, and pyrrhotite and arsenopyrite. The best values would appear to be at and close to the diorite contact, for it is here that oxidation is most intense in the limestone, and the sulphides are most massive. The sulphides a short distance from the diorite hanging wall tend, in places, to follow along easily replaceable bedding planes in the limestone. This is best illustrated in a short raise put up into the back of the main adit 75 feet in from the portal, where a width of 29 inches of oxidation and sulphide mineralization is found replacing the limestone between closely spaced bedding planes.

The northeast drift and the 38 foot winze to

the west at 321 feet from the adit portal have developed a similar type of mineralization over a small area.

The second type of mineralization encountered in the Red Tunnel adit workings is that found in the crosscuts driven to the west from the main north drift. Here the limestone beds are found to be altered and sparsely mineralized across widths of 6 to 7 feet with arsenopyrite, pyrite and pyrrhotite in narrow irregular veinlets which generally conform in strike and dip to the steep dipping and enclosing host rocks. The mineralized areas are readily identified underground by the presence of garnet and minor amounts of epidote. In places the sulphide mineralization is seen to follow across the beds of the limestone in irregular fracture fillings of small width. The replacement and fracture filling type of mineralization is cut by all three of the westerly directed crosscuts from the main north drift and also again near the face of the main north drift near the contact of the limestone beds with the diorite stock which forms the core of the mountain. Diamond drilling in this area has disclosed the continuation of this type of mineralization below the level.

The third type of mineralization occurs as fracture filling in a narrow vertical dipping vein, 3 to 6 inches wide, which has been opened along the main north drift for a length of 75 feet northward from a point 280 feet in from

the adit portal. The fracture is filled in places with heavy massive arsenopyrite, and occasionally with pyrrhotite, much of the sulphides having been oxidized to limonite.

What may be a fourth type of mineralization has been indicated by the diamond drill core from holes 7, 8, and 9, drilled to the north and northeast from the end of the main north drift. The core from these holes contains pyrite, pyrrhotite, and arsenopyrite, with small amounts of sphalerite, in fracture fillings and disseminations in the diorite. It is considered possible that these drill holes have encountered a fractured area in the diorite where the fractures have been mineralized in sufficient number to give the assay results obtained in these drill holes.

MINERALOGY.

The principal minerals observed underground in the Red Tunnel adit workings were arsenopyrite, pyrrhotite, pyrite, and limonite. No sphalerite was seen but microscopic examination of the diamond drill core mineral fragments disclosed the presence of sphalerite and chalcopyrite in minor amounts. The sphalerite is associated mostly with the arsenopyrite, and occasionally with the chalcopyrite, and almost always in the

sedimentary rocks, rarely in the diorite. Pyrrhotite was found as fracture fillings and disseminations in the diorite. Arsenopyrite was found as fracture fillings in the diorite as well as in the sedimentary rocks.

The gold bearing sulphides were not separated in the microscopic studies, but a study of the assay results of the many samples taken indicate that the best gold values are found with the arsenopyrite mineralization.

DESCRIPTION OF WORKINGS.

The drifting, raising, crosscutting, and sinking which has been done at the Red Tunnel adit workings is shown in detail on Map HA-2 with this report. The diamond drill holes, No.1 to No.10, inclusive, are shown in relation to the underground development.

The total of 880 feet of underground work done to date includes 548 feet of drifting, 130 feet of crosscutting, 110 feet of raising, and 24 feet of shaft sinking, in the upper, or Red Tunnel adit workings. The lower, or Ruby Tunnel adit workings, shown on Map HA-1, were in 400 feet in slide rock and overburden, at the time of the examination, the adit just entering the sedimentary formations at 350 feet from the portal.

The Red Tunnel adit workings extend 380 feet in a northeasterly direction into the hill from the adit

portal and gain a maximum depth of 165 feet below the surface. The main drift branches at 258 feet northeast of the portal into a northeast branch 140 feet long, and a main north drift branch 154 feet long. At 75 feet in from the portal a 7 foot raise has been put up; at 90 feet from the portal the 70 foot flat raise, already mentioned was driven up along the diorite hanging wall, and from a point 63 feet up this raise a 32 foot vertical raise was driven through to the surface; at 115 feet in from the portal a 30 foot winze to the northwest was driven; and at 245 feet from the portal a 22 foot crosscut to the northwest was extended to cut the replacement mineralization in the limestone rocks. In the northeast branch drift, and 63 feet in from its start, a 38 foot winze has been sunk in a westerly direction at an angle of 14 to 20 degrees on the dip of a flat sheet of diorite.

Four crosscuts and a 24 foot shaft have been driven from the main north drift at points 22, 55, 55, 97, and 55 feet from its point of commencement. The first two crosscuts are driven in a westerly direction and are 15 and 25 feet long respectively. The second two crosscuts are driven in an easterly direction and they are 18 and 40 feet long respectively. A 10 foot drift to the south was driven from a point 18 feet east of the main north drift, in the 40 foot crosscut. A breakthrough was made between

the 24 foot shaft in the main north drift and the face of the 38 foot winze driven west from the northeast branch drift.

Diamond drill holes, totalling 2922.5 feet in length, and including 9 underground holes from stations in the Red Tunnel adit workings and 2 surface holes drilled from a point several hundred feet east of the adit portal, were drilled during 1935 for the Company by Boyles Brothers, Diamond Drill Contractors. The location, direction, dip and horizontal length of the holes has been plotted on Maps HA-2 and HA-2a, and the log of the core, together with the assay results obtained by the Company and the Resident Mining Engineer, is shown in detail on Maps HA-4, HA-5, and HA-6.

The diamond drilling, for several reasons, did not give the positive information that it should have. Little, if any, use was made of the knowledge of the structural geological conditions exposed in the underground workings, with the result that several of the holes were drilled in directions and at dips which corresponded closely with the strike and dip of the sedimentary formations, and they consequently could not give the same information as if they had been drilled at angles perpendicular to the bedding planes of the sedimentary rocks. Many of the holes were

consequently drift holes rather than crosscut holes, and, of course the information has to be interpreted with this in mind.

Drill Hole No.1 put down at 45 degrees for 77 feet from a point 7 feet northwest of the 24 foot shaft in the main north drift, appears to have followed the 3 to 6 inch, vertically dipping fracture for most of its length, and the results must be so interpreted, and any assays obtained could only refer to a comparatively small tonnage of ore.

Drill Holes 2, 3, 4, and 5, were all drilled as drift holes at or close to the dip of the enclosing limestone formations and could consequently only give information about comparatively narrow ore widths, bearing in mind the type of mineralization exposed in the crosscuts driven to the west of the main north drift. It is also a very probable possibility that these holes which were started across the limestone formations at very small angles, steepened in dip as they were drilled, and they may therefore have been drilled directly along the bedding planes. This would almost be sure to happen if a hard band of silicified limestone overlay a comparatively soft mineralized bedding plane. As the mineralization in the area drilled most intensively tends to follow the bedding planes in the sediments it naturally follows that a most

erroneous interpretation could be given to the drill core assays if due consideration was not given to the structural attitude of the enclosing rock formations.

As will be mentioned presently, the core from the diamond drill holes was practically all crushed for assay purposes by the Company officials and it was, therefore, impossible to obtain the detailed geological information from the core, that could, and should have been obtained, had the core been properly split for assay and geological record purposes.

SAMPLING PROCEDURE AND ASSAYS.

The underground mineral exposures in the oxidized mineral zones near the portal of the Red Tunnel adit, and in the northeast branch drift and adjoining winze to the west, were sampled by moiling channel samples from across the mineralized zone widths at 5, and, in two instances, 10 foot intervals along the exposed length and depth of the exposures.

The mineralization exposed in the west cross-cuts from the main north drift, and in the end of the main north drift, was sampled by moiling channel samples from across the zones at right angles to the dip of the enclosing sedimentary rocks, and, therefore, at right angles to the general trend of the mineralization.

The moiled channels were approximately 3 inches wide and $\frac{1}{2}$ inch deep, the average weight of sample taken being between $1\frac{1}{2}$ and 2 pounds per lineal foot of sample channel. Seventy channels were cut, and two chip samples, one from the walls of the 24 foot shaft and one from the west wall of the main adit 240 feet from the portal, were taken. The total weight of moiled samples was 600 pounds.

The sampling of the diamond drill core, or rather, all that remained of it after the original sampling by the Company officials, was done with a twofold purpose, first, to check the assays obtained by the Company, and second, to determine, if possible, if the core sampling had been properly done by the Company officials.

When originally sampling the core, the Company superintendent first made a geological record of the drill core as it was taken from the holes, and then he and the foreman crushed the portions of mineralized core in a small hand operated jaw crusher to about 3 to 4 mesh, after which the core was divided into two portions, one portion being taken for assay, and the other portion being returned to the core box. The core was then placed in the core house which was not kept locked.

This core sampling procedure adopted by the Company officials regretably, but nevertheless very successfully succeeded in destroying the future worth of the

remaining core fragments for geological study, and quite naturally made it very difficult, if not impossible, to study the precise manner in which the mineralization occurs. It is also obvious that the core remaining in the boxes had to be treated with suspicion, as the possibility for either intentional or unintentional salting of the original core assays existed, and its detection was made very difficult.

Accordingly, and with above facts and thoughts in mind, the core fragments which remained in the core boxes were sampled in the following manner by the Resident Mining Engineer, with the Company's representative, B. W. W. McDougall, consulting mining engineer, of Vancouver. It was first agreed that only those sections of the core which had returned an assay of more than 0.14 ounces gold per ton would be check sampled. The sections of core from which these assays had been obtained were carefully removed from the core boxes, one section at a time, and after thorough rolling and mixing on a canvas sheet the entire amount of core fragments remaining were split with a Jones riffle into two parts, one part being returned to the boxes, and the other part after further mixing, being split again into two samples. The Resident Mining Engineer took one sample and the Company's representative took the other. The samples were assayed at different laboratories, and the results corresponded within the prescribed limits.

The Company officials in their original sampling of the core had continued their core crushing procedure in all the first nine holes drilled and to a point 558 feet from the collar of No.10 drill hole, after which the core was properly split for assay and geological purposes.

In order to check the Company assays on core which had been properly split the Resident Mining Engineer and the Company's representative, B.W.W. McDougal, took the remaining core halves, leaving a few pieces in each core section for future geological reference, and after properly mixing the core so removed, made two samples of it with the Jones riffle. The assay results from these core samples cannot be readily explained in a satisfactory manner.

The results of the core sampling, together with the original Company assays for comparative purposes, are shown in detail on Maps HA-4, HA-5, and HA-6, with this report. Summarized assay results of core sampled by the Resident Mining Engineer are shown on the assay map, HA-2a, with the assay results from the channel sampling of the underground mineral exposures. The assay certificates for all assays are given in Appendix #4.

Assays.

The assay results obtained by sampling the underground mineral exposures are seriously different, and

much lower than the assays which were reported by the Company's engineer W. S. Bacon.

The mineral exposures in the "Oxidized Orebody" returned an average value of 0.128 ounces gold per ton over the 239.5 foot sampling length and across an average width of 45.7 inches. With gold valued at \$34 per ounce, 0.128 ounces gold per ton is equivalent to \$4.35 per ton, a figure which is much lower than the \$9 to \$11 per ton values given to this mineral zone by W. S. Bacon, the Company's engineer. The best assay section in this mineral zone was a 30 foot length, averaging 58 inches in width, and containing, according to the Resident Mining Engineer's sampling, 0.27 ounces gold per ton. This section is located near the head of the winze between points 107 and 137 feet from the portal of the Red Tunnel adit.

The mineral exposures in the west crosscuts from the main north drift and in the end of the main north drift returned assays of but a trace to 0.03 ounces in gold per ton, with one sample of the 14 channel samples taken assaying 0.12 ounces gold per ton. These assay values correspond in their location with samples taken by the Company. In the article appearing in the Vancouver News Herald, issue of January 13th, 1936, it is reported that this mineral zone is 250 feet long and $6\frac{1}{2}$ feet wide, with an average ore value of \$12, the said report being prepared from a progress report issued by the Company.

The assay results of samples taken in the winze from the northeast branch drift and from the drift walls of the northeast branch drift were not encouraging. The mineral zone in the winze averaged 0.03 ounces gold per ton for a length of 35 feet and across an average width sampled of 28 inches. The northeast drift sampling indicated two samples which assayed 0.26 and 0.34 ounces gold per ton, across widths of 36 and 46 inches, respectively, but the assay average for the 80 foot length sampled across an average width of 43 inches was only 0.08 ounces gold per ton.

The diamond drill assay results up to the point 558 feet from the collar of No. 10 drill hole where the core was first split, instead of crushed, for assay purposes, correspond in a general way very closely with the original core assays obtained by the Company. However, the core assays on samples of split core below the 558 foot point in the No. 10 drill hole, obtained by the Resident Mining Engineer, do not in any way check the assay results obtained by the Company officials, on the similar core lengths. The 6 samples taken by the Resident Mining Engineer of split core, (and these assays checked very closely with the samples taken by B. W. W. McDougall) assayed but a trace in gold over the 50 feet sampled, whereas the corresponding assays by the Company said to have been made on the other half of the core, and on similar core sections

assayed an average of 0.175 ounces gold per ton. This serious discrepancy in assays is not readily explainable. It is quite possible that the original sampling by the Company officials was inaccurately done by including only the narrow sulphide mineral streaks in their sample, and excluding from their sample the unmineralized sections of diorite core in which the samples were taken. There can be no doubt as to the accuracy with which the balance of the core was sampled by the Resident Mining Engineer and the Company's representative at this sampling, B. W. W. McDougall, as the assays obtained in both sets of samples checked almost exactly. This unexplained and most serious discrepancy of the original Company sampling with the later sampling by the Resident Mining Engineer and the Company's representative, B. W. W. McDougall, naturally throws a grave doubt on the accuracy of the entire core sampling, and the possibility exists that the crushed core remains from the original sampling by the Company officials may not represent a true sample of the core as it was first drawn from the drill holes. As the core was housed in an unlocked house it would have been possible for anyone so interested to have salted the core by the introduction of high grade sulphides in crushed form, similar in size and appearance to the crushed core made for assay purposes. As several assays of pure sulphide mineralization in the form of fragments taken from the crushed core showed assays of from 1.30 to 3.74 ounces gold per ton it would not take a very large amount of

ore of this grade to effectively salt the comparatively small bulk of drill core available for sampling. These assays also indicate that sulphides of high grade can be obtained in the mineralization exposed underground over narrow veinlet widths.

In order to check the possibility that foreign mineralization might have been introduced into the crushed core several of the core samples (crushed core only) were examined megascopically and microscopically by Assistant Resident Mining Engineer, J. S. Stevenson, in the Department of Mines laboratories, at Victoria. His report is to be found in Appendix #5 with this report. Briefly his conclusions are, as follows:

" A megascopic and partial microscopic examination of the rock and sulphide fragments did not solve the problem of whether or not the samples had been salted by the introduction of sulphide fragments."....."Although the data obtained did not definitely solve the problem, the generalizations suggest that the samples were not salted by introduced sulphides."

Summing the drill core assay results briefly, it can only be definitely said that the assay results obtained by the Resident Mining Engineer are representative of the core fragments, both crushed and uncrushed, which remained in the core boxes at the time of his sampling. In the case of the crushed core where a possibility for tampering with the core assays did exist, the assay results check, but where the core was split in the proper manner, the assays do not check in any way. This latter discrepancy can possibly

be explained by the fact that the salting of the samples may have been unintentional, and the original samples taken by the Company officials from the split core might have contained all the sulphide mineralization which was contained in the original unsplit core as it came from the drill hole, with the consequent impoverishment of any further assays which might be made on the split core remaining in the boxes after the first samples had been removed.

ORE RESERVES

It is not possible to estimate any appreciable tonnage of commercial ore from the underground work and diamond drilling which has been done to date in the Red Tunnel adit workings, nor is it possible to even indicate that any appreciable tonnage of commercial ore has been located by this work.

In the case of the "Oxidized Orebody" in the workings near the portal of the Red Tunnel adit, the average grade of the mineralization, as determined by the Resident Mining Engineer's sampling, is only 0.128 ounces gold per ton. This value of 0.128 ounces gold per ton is equivalent to \$4.35 per ton, with gold at \$34 per fine ounce. In this oxidized section of the workings near the winze only one short section, 30 feet long with an average width of 58 inches, approaches a value that might be termed ore. The assay value of this 30 foot section, which is located at the top of the 30 foot winze, is 0.27 ounces gold per ton, or \$9.18 per ton

at \$34 per ounce gold. As the values in the winze terminate 15 feet to the west of the main adit drift rather abruptly, and as the assay values in the flat raise to the east are only 0.142, or \$4.83 per ton in gold, the tonnage of 0.27 ounce gold ore indicated in this mineralized oxide zone is only a few hundreds of tons.

The sampling of the steep dipping mineralized and altered limestone beds in the crosscuts to the west of the main north drift failed to indicate any assays of commercial value, most of the assays of samples across mining widths averaging a trace to 0.03 ounces gold per ton.

Sampling and assays of the mineralized oxide zone in the northeast branch drift and the winze to the west therefrom when computed as averages are not commercial.

Giving due consideration to the possibility that the drill core remains, as sampled and assayed, might not be representative samples of the core as it was when it was originally taken from the drill holes, and assuming that the cores were not intentionally salted by the introduction of sulphide fragments, then a true estimate of the value of the diamond drilling as an indication of ore possibilities can only be made if due consideration is given to the structural conditions controlling the enclosing rock and mineral formations. On the basis of the above conditions the diamond drilling has indicated interesting mineralization, but not sufficient drilling has been done on which to base

any calculations of even possible ore tonnages.

In the No. 1 drill hole, already mentioned, the course of the drill hole was down along a mineralized fracture, 3 to 6 inches in width, and the assays obtained can consequently only refer to a negligible tonnage of ore. In this hole the Resident Mining Engineer's samples were of lower assay value than those obtained by the Company in their original sampling. An assay of 0.32 ounces gold per ton was obtained by the Company officials on the core from 40.5 to 53.5 feet, despite the fact that the core from 42 to 48 feet was not sampled.

In drill hole No. 2, the assays obtained by the Resident Mining Engineer check those obtained by the Company for the first 160 feet of hole where the mineralization occurs in limestone, but throughout the remainder of the hole where the mineralization occurs in fine-grained diorite, the assays obtained by the Resident Mining Engineer averaged about one third the assays obtained by the Company. In this hole, which is the best of all the holes drilled as far as assays are concerned, the direction was such that a very small downward deflection in the dip of the hole would have resulted in its being drilled along a single bedding plane in the limestone. The holes were not surveyed as they were drilled and such a condition cannot be definitely stated to exist, but it is nevertheless a definite possibility as the limestone beds are of varying hardness and are interbedded with harder

silicified bands and quartzitic beds of sediments. The maximum thickness of limestone beds which could have been penetrated by this hole, assuming it was not deflected downward in its depth and that the limestone beds do not materially change their dip below the level, would have been 21 feet, and the thickness of ore represented by the 5, 18, and 15 foot core assays of 0.38, 0.49, and 0.32 ounces gold per ton, would be 0.44, 1.57, and 1.31 feet, respectively. If the hole increased slightly in dip as it was being drilled these true thicknesses would be correspondingly smaller, until the dip of the hole corresponded to the dip of the limestone bedding, in which event the true thickness of the samples taken by the drill would be the thickness of the core, or 15/16 of an inch.

Similar conditions were encountered in drilling holes No. 3, No. 4, and No. 5, and the assay results of core samples from these holes represent but small thicknesses of ore. The 44 foot core length assaying 0.47 ounces gold per ton in hole No. 3 at 139 to 183 feet represents a true thickness of 3.84 feet, assuming that the dip of the hole does not steepen and the dip of the limestone beds remains a constant. The thickness would be less than this as the dip of the hole steepened in depth and approached the dip of the sedimentary bedding planes.

Hole No. 6 cuts across the sedimentary beds at 20 to 30 degrees and the assays of core from this hole

represent greater widths than in the preceding holes, but drift samples in the crosscut northwest from a point 245 feet in from the portal of the Red Tunnel adit, and directly above and within 10 feet of the core assay nearest the collar of the hole, returned an assay of 0.02 ounces gold per ton as compared with 0.80 ounces gold per ton for the core sample. The maximum thickness of mineralization of ore grade in this hole is calculated to be 3 feet.

Drill holes No. 7, No. 8 and No. 9 contained core which returned good assays, but the precise nature in which the mineralization occurs could not be determined because of the unfortunate crushing of the core by the Company officials in their original sampling. Holes No. 7 and No. 8 are drilled within 25 feet of each other, but the assay sections in these two holes do not indicate a continuation of the mineralization between the holes. Channel sampling of the mineralized zone near the face of the main north drift, and within a few feet of good assay core samples from hole No. 8 and No. 9, assayed only a trace in gold per ton.

One crushed core sample and 6 split core samples taken from this hole have already been discussed at some length. The crushed core sample at 553 to 558 feet depth from the collar of the hole assayed 0.20 ounces gold per ton. The split core samples assayed but a trace in gold per ton. The lowest point, therefore, that assay

values were obtained in the drilling is 415 feet below the elevation of the Red Tunnel adit workings, or 215 feet above the elevation at the portal of the Ruby Tunnel adit.

No core samples were taken from No. 11 drill hole as no mineralization of sufficient intensity could be found in this hole worth sampling. This hole is drilled in a south 60 degree east direction from a surface setup near the collar of No. 10 drill hole.

In view of the above comments on the drilling and the assay results of the samples of the crushed core it is not possible to estimate any tonnage of possible commercial ore. The drilling already done has, however, indicated an interesting mineralized condition and further work should be done by drilling several crosscut drill holes across the mineralized limestone beds in the vicinity of the best assay core sections to determine the lateral extent and thickness of the mineralization.

EQUIPMENT AT THE PROPERTY

Equipment at the Red Tunnel adit workings comprises one tool shed and core house, and one frame office building. Mining equipment such as rails, pipe, etc., have been removed from the underground workings of this level to the new working place at the Ruby Tunnel adit.

Mining equipment at the Ruby tunnel adit includes: a 450 cubic foot Gardner compressor direct

connected to a 75 H. P. 3 phase, 2200 volt electric motor; a Gardner steel sharpener, Gardner oil furnace; machine drills, machine drill steel, one-ton capacity. hand dump cars, rail, pipe, etc., and necessary blacksmith and hand tools. Water for development purposes is delivered by pipe from two springs on the property to a heated water tank located a short distance west and above the adit portal. Ventilation in the adit is provided by an electric fan installation located at the portal, and 12 inch galvanized iron pipe into the adit. The machinery and equipment is adequately housed in frame buildings. There is a combined compressor house and blacksmith - steel sharpening shop, a dry room or change house for the men, a powder house, fan house, and a lunch room for the men.

CONCLUSIONS

Summary

The underground development and diamond drilling at the Red Tunnel adit workings so far has not indicated any appreciable tonnage of commercial ore.

The sampling of the "Oxidized Orebody" shows it to contain an average of 0.128 ounces gold per ton which is too low grade to be considered as ore when due consideration is given to the difficulties attendant on the mining of a narrow flat dipping deposit

situated in close proximity to the surface. Only one short section of the mineralization exposed in this "Oxidized Orebody" approaches a value that could be considered ore. This 30 foot section averages 0.27 ounces gold per ton across an average thickness of 58 inches.

The sampling of the mineralization exposed in the west crosscuts off the main north drift failed to indicate the presence of any ore whatsoever. This is a serious difference from the \$12.00 (0.35 ounces gold per ton) value given to this section by the company.

The diamond drilling can not be said to indicate the presence of any large tonnage of commercial ore because:-

1. The holes for the most part are drilled in a direction that corresponds closely to the dip, or length of the mineralization and no data concerning either the thickness or length of the mineral zones indicated has been accurately ascertained.

2. The sampling of the drift and crosscut mineral exposures in close proximity to good core assays obtained in the diamond drill holes failed, in every instance, to check, by differences too great to be satisfactorily explained.

3. The sampling procedure adopted by the company officials has thrown a serious doubt on the accuracy of their sampling, particularly in the light of the assay results obtained in the No. 10 drill hole below the 558 foot point.

However, assuming certain conditions with regard to the diamond drilling, core sampling and assay results, (these conditions are given in the body of the report, pages 32 to 41 inclusive) the diamond drilling from stations in the Red Tunnel adit has indicated interesting mineralized conditions in both

the sedimentary and igneous country rocks, and further work is justified on this level to determine the true extent and value of this mineralization.

Comments on
Company reports and Published Information.

The statements given on pages 2, 3 and 4 of this report, (see also Appendixes # 1 and # 2) and which were made public through company and newspaper sources early in January 1936 are inaccurate and seriously misleading.

In a summary report to the Directors of the Company, on November 6th, 1935, W. S. Bacon, the Company's engineer makes several specific statements of fact. These statements with the Resident Mining Engineer's comment are:

1. W. S. Bacon's statement:

"My own conclusion, which I shall present in the near future, is that you have an indicated ore body of at least half a million tons of commercial ore."

Resident Mining Engineer's Comment.

It is not possible, from the underground work and diamond drilling done to date to indicate any appreciable tonnage of commercial ore.

2. W. S. Bacon's statement.

"Originally an outcrop of oxidized ore was drifted on by the original owners. Subsequent development by cross, winze and raise indicates that a large tonnage estimated at 35,000 tons of oxidized ore was developed. A careful sampling of this body of ore was indicated confirmed me in the opinion that the values range from \$9.00 to \$11."

Resident Mining Engineer's Comment.

The tonnage of 0.27 ounce gold ore (\$9.18 per ton at \$34. gold value) indicated in this "Oxidized Orebody" or mineralized zone, in the outer section of the Red Tunnel adit workings is only a few hundreds of tons. A thorough sampling of all the mineral exposures in this mineralized zone returned an average assay value of only 0.128 ounces gold per ton, or \$4.35 per ton, with \$34 gold values.

As the mineralization is exposed only on two sides it can not be classed as "Developed ore". The indicated tonnage of mineralization present as Possible Mineralization is 3,500 tons having an average thickness of 45.7 inches and an average assay value of 0.128 ounces gold per ton (\$4.35).

3. W. S. Bacon's statement.

"The interior holes namely, Nos. 1 to 9 inclusive, disclosed the presence of a large body of commercial ore capable of being mined and milled at a low figure."

Resident Mining Engineer's Comment.

The drilling in holes Nos. 1 to 9 inclusive can not be definitely said to have disclosed a large body of commercial ore, but some interesting core sections were obtained in these holes which warrant further underground work to prove the true extent of the mineralization indicated.

4. W. S. Bacon's Statement.

"No. 10 hole drilled to 900 feet indicated positively that the ore body had a downward extension over 500 feet."

Resident Mining Engineer's Comment.

"Sampling of the core from No. 10 drill hole showed only one assay value, of 0.20 ounces gold per ton, in the hole between points 553 and 558 feet from the collar, which corresponds to a maximum depth of 298 feet below the Red Tunnel adit level. This assay core section is the deepest obtained in the diamond drilling and calculation shows it to be 432 feet below the surface, considerably less than the 500 feet downward extension mentioned above by W. S. Bacon. Furthermore this mineralized core section has no apparent connection with the mineralized sections obtained in drill holes Nos. 1 to 9 inclusive as they are all drilled in ground structurally quite considerably to the west, and it is therefore incorrect to describe the assay results in the No. 10 hole as being connected to and part of one "ore body."

5. W. S. Bacon's statement.

"The condition disclosed (in No. 11 hole) would indicate in my mind that you can develop an orebody here as significant as your already ascertained one; I am of the opinion that you will find it even larger than the one already indicated by Nos. 1 to 10 drill holes."

Resident Mining Engineer's Comment.

The core from No. 11 drill hole was carefully examined but no mineralization of sufficient intensity could be found that warranted sampling. There is absolutely no justification for the above statement by W. S. Bacon in view of the core evidence from the No. 11 drill hole.

6. In the calculation sheet attached to W. S. Bacon's Summary Report of November 6th, 1936⁵, to the Company, his method of calculating the ore reserves from the diamond drilling is given. Briefly the method used was as follows: The whole volume of ground between the bottom of the No. 10 drill hole and the Red Tunnel adit (540 feet depth) and over an area of 73000 square feet (equivalent to 200' x 365') at the Red Tunnel level was considered to be definitely mineralized. This block of ground was divided into 20 foot blocks, each of which it was estimated weighed 700 tons, thus giving a total mineralized volume of 3,449, 600 tons, for the 4928 blocks in the mineralized zone.

Then after deducting 400 feet from the total drilling done in Holes Nos. 1 to 10 inclusive, it was stated "we have 2130 feet (drill hole footage or 1274 feet horizontal) of actual drilling done in the mineralized zone. " "Of this drilling 627 feet or 627/2130 was in ore ranging from \$2.00 to \$24.00 classified as follows:- "

" $\frac{165}{627}$ average \$13.44"

" $\frac{167}{627}$ average 6.90"

" $\frac{295}{627}$ average 3.95"

On the calculation sheet it is further stated:

"Now taking the 4928 blocks of the mineralized zone as proved by the drilling that 627/2130 is in ore we find that 1450 blocks are actually ore of which!"

"382	blocks	or	267,400	tons	have	value	@	\$13.44	of	\$3,593,856"
"385	"	"	269,500	"	"	"	@	6.90	"	1,859,550"
"683	"	"	478,100	"	"	"	@	3.75	"	1,792,875"

1450

1015,000

\$ 7,246,281

Resident Mining Engineer's Comment.

The above method of estimating ore reserves is absolutely without foundation and the estimates so prepared are preposterous.

No consideration whatsoever is given to the individual and collective attitudes of the drill holes; to the correlation of assay core sections in the various holes, one with another; to the structural conditions governing the rocks in which the holes were drilled; to the character of the mineralization drilled; to the fact that several of the holes were drilled as drift holes instead of crosscut holes; to the fact that different types of mineralization were drilled; to the fact that there is no ore indicated within 240 feet vertically above the bottom of No. 10 drill hole; and finally to the fact that it is not possible to combine bulk averages in the calculations as was done in this case.

As stated in the Resident Engineer's Comments #1 and #3 it is not possible, from the underground work and diamond drilling done to date to indicate any appreciable tonnage of commercial ore.

The Vancouver News Herald on January 13th, 1936, contained an article written from a progress report issued by the Company and it contained among others the following statements:

7. Statement in Vancouver News Herald.

"An indicated ore body of at least 500,000 tons of commercial ore is estimated by W. S. Bacon, M. E., engineer for Hedley Amalgamated Gold Mines, Limited."

Resident Mining Engineer's Comment.

See Comment under No. 1.

8. Statement in Vancouver News Herald

"The first 200 feet driven" (Red Tunnel Adit) "resulted in the blocking out of 35,000 tons of \$12.00 ore with an additional 19,000 tons of similar ore on the dump."

Resident Mining Engineer's Comment.

See Comment under No. 2.

With respect to the 19,000 tons of similar ore stated to be on the dump it is pointed out that the total volume of ore and waste taken out of the Red Tunnel adit workings, including all drifts, raises, winzes, shafts and crosscuts was only about 3100 tons, and as the greater proportion of this was waste the statement made above is obviously ridiculous.

9. Statement in Vancouver News Herald.

"As the Red Tunnel was extended further it opened up another ore body 250 feet long and 6½ feet wide, with an average ore value of \$12.00.

Resident Mining Engineer's Comment.

The sampling of the mineralized zone above referred to failed to show the presence of any ore whatsoever. This refers to the ore exposed in the west crosscuts from the main north drift.

10. Statement in Vancouver News Herald.

"At the time this ore was first developed, Mr. Bacon stated that if this body extended to a depth of 150 feet, a profitable mine of good size could be assured. Since that

10. Statement in Vancouver News Herald (cont'd)

date through further development and through diamond drilling of 11 holes, all of which penetrated the ore, this large ore body, in the shape of a funnel has been proven to a depth of about 700 feet. To the east of this ore body and parallel to it, diamond drilling proved an ore condition analagous to that obtaining in the main body, in the ground to the east of the main area drilled.

Resident Mining Engineer's Comment.

See Comments Nos. 1, 3, 4 and 5.

These comments by the Resident Mining Engineer state briefly that it is not possible to estimate any large tonnage of commercial ore from the work done to date; that the deepest core assay is but 432 feet below the surface, not about 700 feet; and that there is absolutely no justification for the statement that diamond drilling proved "an ore condition analagous to that obtaining in the main body".

Recommendations.

As pointed out in the last paragraph of the summary, the diamond drilling in the Red Tunnel adit has indicated interesting mineralized conditions in both the sedimentary and igneous country rocks and further work is justified from the Red Tunnel adit workings to determine the true extent and value of this mineralization.

It is therefore recommended as follows:

1. Discontinue the driving of the Ruby Tunnel adit for the present, and until such time as further evidence has been obtained to show that mineralization continues to this depth.

2. Immediately re-equip the Red Tunnel adit workings with mining facilities so that further underground development work and diamond drilling can be continued from this level.

3. Underground work should then be done as follows: (a) Drive a west crosscut from the face of the present west cross-cut off the main north drift 313 feet from the level portal. This west crosscut should be driven not less than 150 feet and a diamond drill station should be cut near its western end.

(b) A 90 foot drift in a north 80 degree east direction should be driven above the line of the No. 8 drill hole to check the mineralization found in this hole.

(c) Crosscuts from this 90 foot drift might also be driven to the north-west to determine

the possible upward extension of the ore indicated in Drill Hole No. 9.

4. Diamond drilling of crosscut holes, that is holes crosscutting the sedimentary formations at right angles to their dip, should be put down from the end of the 150 foot west crosscut to determine the true thickness and possible vertical and lateral extent of the ore exposure indicated in drill holes No. 2, No. 3 and No. 5.

(a) The core from these new holes should be sampled in a proper manner by a duly qualified man, preferably in the presence of a disinterested, but technically competent observer.

5. The entire development programme should be under the supervision of a capable technical engineer so that proper sampling may be done and in order that the results obtained will be correctly correlated and interpreted.

If this work, as recommended, discloses encouraging mineralization of economic value, and if it checks the diamond drilling already done, it is then further recommended that a winze be sunk from the Red Tunnel adit level on the dip of the

favorable limestone formation through the best mineralized ore sections so found, and that further underground work as drifting, crosscutting, raising and diamond drilling be done from levels established 150, and if necessary 300 feet below the present adit level.

All of which is respectfully submitted.

"A.M. RICHMOND"

Resident Mining Engineer

B.C. Department of Mines.

Mineral Survey District No. 4.

Penticton, B.C.

April 14th, 1936.

APPENDIX #1.

Copy of W. S. Bacon's Summary Report
Submitted by the Company
to the
Resident Mining Engineer.

Appendix #1.

Copy of W. S. Bacon's summary report
submitted by the Company to
the Resident Mining Engineer

Vancouver, B.C.,

November 6th, 1935.

President, Managing Director, and Directors,
Hedley Amalgamated Gold Mines Limited,
Vancouver, B.C.

Gentlemen:

A summary report on the property
and operations of the Hedley Amalgamated Gold
Mines, Limited, at Hedley, B.C.:

The Hedley Amalgamated Property
located on Stemwinder Mountain three-fourths of
a mile from the Nickel Plate mine, consists of:
Nineteen claims and six fractions:-

"Whirlwind, Cyclone, Cracker Jack, Jumbo,
Ridge, Butte, Cannon Ball, Billy Goat #1,
Billy Goat #2, N.S. Atlas, and Joan
Fraction, Melva, Ruby, Blue Grouse, Mule
Deer, War Eagle and Bull Dog Fraction,

Copy of W. S. Bacon's summary report. - 2 -

Pan, Pan #2, Mac Fr., Pan Fr., Reb. Fr.,
and Pan #2 Fr."

A Twenty-one year lease has been secured on ten acres on Similkameen River for mill site.

The Great Northern Railway and Princeton-Osoyoos Highway traverse the property.

The West Kootenay Power Company transmission line crosses the claims and this Company has lately completed installation of Transformer, Sub-station, about one mile east of the proposed mill-site. Power line is now being run to the location of new working tunnel.

Ample timber for all mining and milling purposes is available on the property.

Adequate bunk-houses, mess house, etc., for accommodation of twenty men have been built. Tool houses, blacksmith shops, Superintendent's office and Storage for equipment and supplies have been constructed and equipment, rails, ore cars, tools, etc., for present development are on hand.

Copy of W. S. Bacon's summary report.

- 3 -

A 30' x 15' compressor house and blacksmith shop are in course of construction at this time.

Substantial auto road has been built from highway to an elevation of 700 feet. Excellent trails of low gradient permit of easy access to all parts of the property. Government road extends five miles up Twenty Mile Creek and crosses the claims on the Creek side of the property. The Auto road is being widened and extended to the side of new tunnel portal.

On the Claims on Twenty Mile Side considerable work has been done consisting of tunnels, with crosscuts, open cuts and trenching and the information gained shows the mineralized zone running down to the Creek and up the other side on the Billy Goat Claims.

However, the main operations have been confined largely to the Similkameen Side of the property. The diamond drilling program which I advised has been abruptly concluded owing to the recent severe weather which froze the water line supplying the drill operated by Messrs. Boyles

Copy of W. S. Bacon's summary report. - 4 -

Bros. Limited. I may say that No. 11 hole was drilled on a body of ore paralleling the ore body into which the 10 holes were driven.

You will appreciate the fact that a detailed report is not possible at the moment as at present I am having the core on the remainder of No. 10 drill hole split and the results together with the results of No. 11 drill hole will be embodied in my complete and detailed report which is in preparation.

As you wished to be advised in a general way regarding the condition of affairs and my recommendations on the operation of your property I am advising you briefly in respect to conditions to date and I shall include my specific recommendations for future procedure.

I shall ask you to make reference to my previous reports on your property and also to the findings of the other Engineers that have examined the property.

In brief the condition is as follows:

Copy of W. S. Bacon's summary report. - 5 -

Originally an out-crop of oxidized ore was drifted on by the original owners. Subsequent development and exploration by cross, winze, and raise indicates that a large tonnage estimated at 35,000 tons of oxidized ore was developed. A careful sampling of this body of ore was indicated confirmed me in the opinion that the values range from \$9 to \$11.

Work was carried on and the oxidized condition entered a sulphide condition. A number of cross cuts were driven under my instruction after the main or red tunnel was directed to the North west where an ore body was encountered. The cross cuts to the west established the condition which I anticipated and the values were most commendable ranging from \$9 to \$15 to the ton.

The problem consequent on the discovery of this condition had to be met in one of two ways: either one could sink a shaft and ascertain and develop the downward extension of the indicated ore body. The alternative was to diamond drill from the horizon of the "Red" tunnel and thus ascertain

Copy of W. S. Bacon's summary report. -6-

and indicate the downward extension. I advised diamond drilling and as a result nine interior holes were drilled and two from the outside. You will observe that the results obtained in No. 2 hole were so satisfactory that a cross cut to the east was used to drill No. 5 hole with a view of establishing the eastern boundary of the ore deposit disclosed by No. 2 hole. As the offset on No. 5 was not sufficiently great to gain a commensurate depth I advised you to drill a 1000 ft. hole from the outside as this would allow sufficient offset to achieve depth. The interior holes, namely, Nos. 1 to 9 inclusive disclosed the presence of a large body of commercial ore capable of being mined and milled at a low figure. No. 10 hole drill to 900 feet indicated positively that the ore body had a downward extension over 500 feet.

As a result of this diamond drilling program I advised you to drive a tunnel from the Ruby Claim under this indicated ore body and to make immediate preparations to mine and mill the same.

Copy of W. S. Bacon's summary report. -7-

The ore is the characteristic arsenopyrite of this District which was made notable by the success of the Nickel Plate Mine. The milling problem with its involved metallurgy is in the capable hands of Mr. William Asselstine, M. E., who is at present making the requisite tests to determine mill procedure.

An outcrop to the east, and most evidently paralleling the condition explored by the diamond drill program, was entered by No. 11 drill hole to a length of 335 ft. at a 45 degree angle. The results indicate a condition analagous to that obtaining in the ore body which has returned you such satisfactory results.

I shall be able to advise you in the course of a few days the results obtained from this hole. The condition disclosed would indicate in my mind that you can develop an ore body here as significant as your already ascertained one; I am of the opinion that you will find it even larger than the one already indicated by Nos. 1 to 10 drill holes.

Copy of W. S. Bacon's summary report. -8-

As you are for the moment more concerned with conclusions I shall not clutter this summary report with unnecessary detail.

Reference to your maps and assay sheets will reveal the physical condition disclosed by the diamond drilling program. It is a significant fact that ten diamond drill holes all encountered commercial ore. When one considers the range and angle of these holes it is rather difficult to delimit the ore body of the Amalgamated to any positive tonnage. My own conclusion, which I shall present in the near future, is that you have an indicated ore body of at least a half a million tons of commercial ore. I have no hesitancy in saying that you can develop vastly more than this when consideration is taken of the parallel condition referred to above. It may be of interest to you that the parallel condition is not the only one on your property.

In respect to development:- I have advised the facing off of the tunnel on the Ruby Claim. This will give approximately 650 ft.

Copy of W. S. Bacon's summary report. -9-

vertical elevation below the horizon of the Red tunnel. It will be necessary for you to construct a truck road to this portal and erect a compressor house, blacksmith shops and furnish same with the requisite equipment.

I have examined your water supply and find that it is adequate to your needs. Mr. R. P. Brown, B.C.L.S., has completed the survey for your road, power line and tram line and will forward the maps on completion.

As I remarked in my initial report on this unique property, the conditions both physical and geological are about all that could be desired. Subsequent development and exploration have confirmed the original hypothesis. You have only to exercise the necessary precaution of sane management to bring into being a great and profitable mine.

In the rather lengthy and detailed report now in preparation I shall give you the technical reasons for this conclusion. A detail of the formations together with the geological log

Copy of W. S. Bacon's summary report. -10-

of the drill holes and the interpretation of same are somewhat out of place in a summary report. The conclusions and the recommendations which I have made are of course based on the rather voluminous field notes which appear in the final report.

The intrinsic merit of the Amalgamated is proven by the present exploration, its potentiality as indicated by the physical facts disclosed is enormous.

Respectfully submitted.

W. S. Bacon, M. E.
Consulting Mining Engineer,
Professional Mining Engineer,
Member of the Association of
Professional Engineers of
British Columbia.

44 Davis Chambers,
Vancouver, B. C.

42

Ore Estimate Attached to W. S. Bacon's report.

In Connection with Plan of
Diamond Drill Holes and Ore Body.

From the Red Tunnel level to the bottom of No. 10 Drill hole the plan contains 7168 blocks of rock, each block being 20' x 20' x 20' and weighing approximately 700 tons. Of these 7168 blocks, 2240 are not taken into consideration as they lie to the East of the mineralized zone as indicated by the diamond drill holes. This leaves 4928 blocks or 3,449,600 tons which can be definitely classified as mineralized.

In drilling this mineralized zone 2530 feet of drilling was done of which 400 feet of No. 10 drill hole would be eliminated being drilled in blocks to the East of zone under consideration. After deducting the 400 feet from total of 2530 feet we have 2130 feet (drill hole footage or 1274 feet horizontal) of actual drilling done in the mineralized zone.

Of this drilling 627 feet or $\frac{627}{2130}$ was in ore ranging from \$2.00 to \$24.00 classified as follows:-

4

$\frac{165}{627}$ Average \$13.44

$\frac{167}{627}$ Average \$ 6.90

$\frac{295}{627}$ Average \$ 3.95

Now taking the 4928 blocks of the mineralized zone as proved by the drilling that $\frac{627}{2130}$ is in ore we find that 1450 blocks are actually ore of which

382	blocks	or	267,400	tons	have	value	@	\$13.44	of	\$3,593,856
385	"	"	269,500	"	"	"	"	6.90	"	1,859,550
683	"	"	<u>478,100</u>	"	"	"	"	<u>3.75</u>	"	<u>1,792,875</u>
1450	"		1,015,000							\$7,246,281

A mill of 150 tons daily capacity will use 54,000 tons or 77 blocks per year.

Using \$13.44 ore would give 5 years ore supply
Using \$13.44 and \$6.90 ore would give 10 years ore supply.

Using all ore would give 19 years supply.

The above figures do not take into consideration any ore outside the actual area drilled.

APPENDIX #2.

Copy of News Article
in Vancouver News Herald
January 13th, 1936.

Appendix #2.

C
O
P
Y

News Article in Vancouver News Herald

January, 13th, 1936.

HEDLEY AMALGAMATED DEVELOPS

LARGE TONNAGE OF ORE.

An indicated orebody of at least 500,000 tons of commercial ore is estimated by W. S. Bacon, M.E., engineer for Hedley Amalgamated Gold Mines Ltd., according to a progress report issued by the company. The estimate was made after the Red tunnel, including drifts and cross-cuts, had been driven 650 feet into the orebody on the south or Similkameen side of Stemwinder Mountain.

The main workings have been confined to this side of the mountain and the first 200 feet driven resulted in the blocking out of 35,000 tons of \$12 ore with an additional 19,000 tons of similar ore on the dump. As the Red tunnel was extended further, it opened up another orebody 250 feet long and $6\frac{1}{2}$ feet

Vancouver News Herald,

January 13th, 1936.

wide, with an average ore value of \$12.00.

At the time this ore was first developed, Mr. Bacon stated that if this body extended to a depth of 150 feet, a profitable mine of good size could be assured. Since that date, through further development and through diamond drilling of 11 holes, all of which penetrated the ore, this large orebody, in the shape of a funnel, has been proven to a depth of about 700 feet. To the east of this orebody and parallel to it, diamond drilling proved an ore condition analagous to that obtaining in the main body.

The Hedley Amalgamated property is located adjacent to the Nickel Plate and Hedley Mascot mines, which are all developing in identically the same type of ore. The directors plan to construct a mill of 150 tons for the first unit and have it in operation some time in May. They have been advised by W. J. Asselstine, consulting metallurgist, that total costs of operation

Vancouver News Herald

January 13th, 1936.

including mining, milling and marketing would be around \$3.39 per ton. The mill will be constructed beside the railway tracts and the river and will receive ore by aerial tram.

APPENDIX #3.

Copy of letter from Company

Re. Assays

Value of Gold used in Ore Calculations.

Appendix #3.

COPY

HEDLEY AMALGAMATED GOLD MINES, LIMITED.

Registered Office,
801 West Hastings Street,
Vancouver, B.C.

January 20, 1936.

A. M. Richmond, Esq.,
Resident Mining Engineer,
Penticton, B.C.

Dear Mr. Richmond:

All values, and the diamond drill copy have been based on \$34.00 an ounce. At several times we have run the ore for silver on 50¢ per ounce. The amount of silver contained is approximately .68 per ton, so we have paid no attention to this in our assays. We have run into various samples that run high in silver, one dyke in the Red Tunnel having \$64.00 value, but also ran into some spotty streaks on the twenty mile, but have paid very little attention to the silver.

Yours sincerely,

Signed.

R.E.Barker.

REB:CB

APPENDIX #4.

Government Assay Office
Assay Certificates.

Appendix #4.

Government Assay Office

Assay Certificate

I HEREBY CERTIFY that I have assayed the following sample handed me by A. M. Richmond Resident Engineer, Penticton, B. C. and said to represent Samples from the Hedley Amalgamated.

Sample No.	Description	Gold oz. per ton
4976A	47" width 10' W Sta. 10B S. wall winze	trace
7A	36" " 15' W Sta. 10B S. wall winze	0.06
8A	23" " 20' W sta. 10B S. wall winze	0.03 As.-Tr.
9A	30" " 25' W Sta. 10B S. wall winze	0.03
80A	16" " 30' W Sta. 10B S. wall winze	0.04
81A	25" " 35' W Sta. 10B S. wall winze	0.02
2A	21" " 40' W Sta. 10B S. wall winze	0.05
Composite #1-4976A to 4982A winze samples		0.03 Au-Tr.
4983A	36" width 10' N Sta. 10B E. Wall drift	0.26
4A	39" " at Sta. 10B " " "	0.04
5A	46" " 10' S " 10B " " "	0.30
6A	45" " 20' S " 10B " " "	0.02
7A	70" " 30' S " 10B " " "	trace
8A	51" " 40' S " 10B " " "	trace
9A	45" " 10' SW " 10A SE " "	0.02
90A	10" " 20' SW " 10A SE " "	0.04
Composite # 2 - 4983A to 4990A		0.08 Au-Tr
4991A	45" " 60' NE Sta 4 N.W. " "	0.03
2A	60" " 55' NE Sta 4 N.W. " "	0.02
3A	45" " 50' NE " 4 N.W. " "	0.10
4A	79" " 45' NE " 4 N.W. " "	0.14
5A	64" " 40' NE " 4 N.W. " "	0.30
6A	59" " 35' NE " 4 N.W. " "	0.40
7A	53" " 30' NE " 4 S.W. " "	0.22
8A	55" " 25' NE " 4 S.E. " "	0.30
9A	31" " 20' NE " 4 N.W. " "	0.32
4000B	55" " 15' NE " 4 N.W. " "	0.10
1B	55" " 10' NE " 4 N.W. " "	0.04
2B	46" " 5' NE " 4 N.W. " "	0.06

"D. E. Whittaker"
Provincial Government Assayer

Certified Correct Copy
"A.M.R."
Resident Mining Engineer.

Government Assay Office

Assay Certificate.

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Sample No.	Description	Gold oz. per ton
4003B	53" width at Sta. 4 NW wall winze	0.10
Composite #5	- 4994A to 4999A, 4000B to 4003B and 4023B to 4029B	0.17 Ag.-Tr.
4004B	40" width 25' NW Stn. 5-SW wall winze	0.02
5B	60" " 20' NW " 5 SW " "	tr.
6B	51" " 15' NW " 5 SW " "	0.12
7B	51" " 10' NW " 5 SW " "	0.05
8B	60" " 5' NW " 5 SW " "	0.17
Composite No. 3	- 4004B to 4008B inclusive	0.09 Ag.-Tr.
4009B	52" width 5' E Stn. 4, S wallraise	0.08
10B	59" " 10' E " 4 S " "	0.10
1B	48" " 15' E " 4 S " "	0.14
2B	52" " 20' E " 4 S " "	0.16
3B	57" " 25' E " 4 S " "	0.28
4B	53" " 30' E " 4 S " "	0.06
5B	47" " 35' E " 4 S " "	0.06
6B	36" " 40' E " 4 S " "	0.18
7B	32" " 45' E " 4 S " "	0.22
8B	43" " 50' E " 4 S " "	0.10
9B	27" " 55' E " 4 S " "	0.20

"D. E. Whittaker"
Provincial Government Assayer

Certified Correct Copy
"A.M.R."
Resident Mining Engineer

Government Assay Office

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Sample No.	Description	Gold oz. per ton.
4020B	33" width 60' E Sta. 4, S wall raise	0.30
1B	38" " 65' E " 4, S " "	0.10
2B	33" " 70' E " 4, S " "	0.05
Composite #4, 4009B to 4022B - raise		0.12 Ag.-Tr.
3B	46" width 10' SW Sta. 4 NW wall drift	0.08
4B	40" " 20' SW " 4 NW " "	0.02
5B	43" " 30' SW " 4 NW " "	0.08
6B	26" " 40' SW " 4 10'E,SE wll dft	0.34
7B	71" " 50' SW " 4 NW wall drift	0.12
8B	54" " 60' SW " 4 NW " "	0.05
9B	30" " 70' SW " 4 SE " "	0.06
Composite #5, 4994A to 4999A, 4000B to 4003B, 4023B to 4029B.		0.17 Ag.-Tr.
4131B	29" width 13' above floor drift N wall raise 12' S.W. Station 4	0.10
2B	28" width 14' above floor drift S wall raise 17' S.W. Station 4	1.02
3B	6" width 12' above floor drift E wall raise 15' S.W. Station 4	0.10

"D. E. Whittaker"
Provincial Government Assayer

Certified Correct Copy
"A.M.R."
Resident Mining Engineer.

Government Assay Office

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Sample No.	Description	Gold Oz. per ton.
4030B	32" width 15' NE Sta. 7 SE wall drift	0.10
31B	44" " 15' NE " 8 NW " "	0.16
2B	54" " 10' W " 9 drift wall	0.04
3B	72" " NE wall drift NW from Sta 9	0.02
4B	94" " SW " " NW " " 9	0.02
5B	58" " N wall crosscut W of Sta 11	trace
6B	51" S wall crosscut W of Sta. 11	trace
7B	Chip sample walls of 24' Shaft E Sta 12	tr.
8B	50" N wall crosscut W Sta 12, 11' - 15' W	.01
9B	54" N " " W " 12, 20' - 25' W	0.01
40B	64" S " " W " 12, 21' - 26' W	0.03
1B	70" S " " W " 12, 8' - 14' W	trace
2B	78" along W wall drift Sta 13 and ahead	tr.
3B	61" 13' to 18' NW Sta 14, N wall drift	tr.
4B	72" 18' to 24' NW " 14, N " "	tr.

"D. E. Whittaker"

Provincial Government Assayer.

Certified Correct Copy.

"A.M.R."

Resident Mining Engineer.

Government Assay Office

Assay Certificate.

I HEREBY CERTIFY THAT I have assayed the following sample handed me by A. M. Richmond, Resident Engineer, Penticton, B. C. and said to represent Samples from the Hedley Amalgamated.

DIAMOND DRILL CORE ASSAYS.

The core for sampling was the portion of the crushed core which remained after the company had sampled the core. As the core was crushed before the writer could sample it it is impossible to be sure that the material sampled represents a true sample of the original core as it came from the drill hole. Samples # 4125B to 4130B inclusive were of properly split core, and not crushed core as all other core samples were. Further notes regarding the core sampling are given under the proper section of the report.

Diamond Drill Hole #1.

Sample No.	Description	Gold Oz. per ton.
4045B	Crushed core	0.54
6B	" " 35'-42'	0.20
7B	" " 53 $\frac{1}{2}$ '-58 $\frac{1}{2}$ '	0.28
8B	" " 58 $\frac{1}{2}$ '-64'	0.16

Diamond Drill Hole #2.

4049B	Crushed Core	40'-52'	0.14
50B	" "	52'-57'	0.16

"D. E. Whittaker"
Provincial Government Assayer.

Certified Correct Copy
"A.M.R."
Resident Mining Engineer.

Government Assay Office,

Assay Certificate

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D. D. H. #2

Sample No.	Description	Gold Oz. per ton.
4051B	Crushed core 57' - 62'	0.38
2B	" " 62' - 67'	0.26
3B	" " 67' - 72'	0.54
4B	" " 72' - 77'	0.40
5B	" " 77' - 85'	0.52
6B	" " 85' - 90'	0.28
7B	" " 90' - 100'	0.18
8B	" " 100' - 110'	0.18
9B	" " 110' - 115'	0.18
4060B	" " 115' - 120'	0.34
1B	" " 120' - 130'	0.32
2B	" " 145' - 150'	0.13
3B	" " 150' - 162'	0.18
		Cu.-nil; Zn.-0.2% As.-1.6%; S.-1.0%
4B	" " 162' - 167'	0.12
5B	" " 167' - 172'	0.08
6B	" " 172' - 177'	0.14
7B	" " 177' - 182'	0.14
8B	" " 182' - 187'	0.12
9B	" " 187' - 192'	0.12

"D. E. Whittaker"

Provincial Government Assayer

Certified Correct Copy

"A.M.R."

Resident Mining Engineer.

Government Assay Office

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D. D. Hole #2 (cont'd.)

Sample No.	Description	Gold Oz. per ton.	
4070B	Crushed core 192' - 197'	0.08	
1B	" " 197' - 203'	0.13	
2B	" " 203' - 215'	0.16	Cu-Tr.; Zn-0.4%; As-}
3B	" " 215' - 220'	0.24	As-0.9; S.-1.44.
4B	" " 236' - 241'	0.06	

Diamond Drill Hole #3.

4075B	Crushed core 14' - 18'	0.32	
6B	" " 18' - 23'	0.46	
7B	" " 30' - 35'	0.12	
8B	" " 80' - 85'	1.30	
9B	" " 115' - 121'	0.14	Cu-Tr.; Zn-0.3% As-0.5; S.-0.8.
80B	" " 121' - 123'	1.06	
1B	" " 139' - 149'	0.30	
2B	" " 149' - 156'	0.30	
3B	" " 156' - 165'	0.56	
4B	" " 165' - 171'	0.66	
5B	" " 171' - 178'	0.36	
6B	" " 178' - 183'	0.80	

"D. E. Whittaker"

Provincial Government Assayer

Certified Correct Copy

"A.M.R."

Resident Mining Engineer.

Government Assay Office

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Diamond Drill Hole #4.

Sample No.	Description		Gold Oz. per ton
4087B	Crushed core	12' - 22'	0.56
8B	" "	113' - 117.5'	0.10
9B	" "	127' - 140'	0.20
90B	" "	160' - 168'	0.22
1B	" "	175' - 180'	0.40
2B	" "	190' - 195'	0.20

Diamond Drill Hole #5.

4093B	Crushed core	27' - 30'	0.20
4B	" "	30' - 35'	0.16
5B	" "	72' - 73'	0.16
6B	" "	80' - 87'	0.30
7B	" "	157' - 162'	0.42
8B	" "	178' - 183'	0.42
9B	" "	205' - 210'	0.22

Cu-Nil; Zn-0.35%
As-1.4%; S-1.75%

"D. E. Whittaker"

Provincial Government Assayer

Certified Correct Copy

"A.M.R."

Resident Mining Engineer.

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Sample No.	Description		Gold Oz. per ton
<u>D. D. Hole #5 (cont'd)</u>			
4100B	Crushed core	225' - 230'	0.60
1B	" "	230' - 235'	0.24
<u>Diamond Drill Hole #6.</u>			
4102B	Crushed core	8' - 12'	0.80
3B	" "	20' - 25'	0.60
4B	" "	45' - 50'	0.40
5B	" "	50' - 62'	0.22
6B	" "	62' - 68'	0.36
<u>Diamond Drill Hole #7.</u>			
4107B	Crushed core	57 $\frac{1}{2}$ ' - 59'	0.46
4108B	" "	64.5' - 67'	0.58
			Cu-nil; Zn-0.6% As-1.8%; S-3.7%

"D. E. Whittaker"

Provincial Government Assayer.

Certified Correct Copy

"A.M.R."

Resident Mining Engineer.

Government Assay Office

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Diamond Drill Hole #8.

Sample No.	Description	Gold Oz. per ton
4109B	Crushed ore 1' - 11'	0.28
4110B	" " 11' - 16'	0.20
1B	" " 33' - 41'	0.36
2B	" " 41' - 46'	0.26
3B	" " 60' - 65'	0.38
		Cu-nil; Zn-0.5%; As-2.7%; S-3.7%
4B	" " 65' - 76'	0.36
5B	" " 76' - 81'	0.34
6B	" " 81' - 90'	0.26
7B	" " 98' - 103.5'	0.30

"D. E. Whittaker"

Provincial Government Assayer,

Certified Correct Copy

"A.M.R."

Resident Mining Engineer.

Government Assay Office

Assay Certificate

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Diamond Drill Hole #9.

Sample No.	Description		Gold Oz. per ton
4118B	Crushed core	4' - 13'	0.32
9B	" "	26' - 30'	0.22
20B	" "	48' - 56'	0.22
1B	" "	56' - 60'	0.06
2B	" "	60' - 72'	0.50
3B	" "	72' - 81'	0.44

Diamond Drill Hole #10.

4124 B	Crushed core	553' - 558'	0.20 Cu-tr.; Zn-0.2% As-2.6%; S-3.0%
5B	Split core	558' - 566'	trace
6B	" "	570' - 575'	trace As-tr.; S-0.2%
7B	" "	595' - 600'	0.02
8B	" "	620' - 625'	trace
9B	" "	734' - 739'	trace
30B	" "	800' - 822'	trace

"D. E. Whittaker"

Provincial Government Assayer

Certified Correct Copy

"A.M.R."

Resident Mining Engineer.

Government Assay Office

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SPECIMEN COUNTRY ROCK AND SULPHIDE ASSAYS

Sample No.	Description		Gold oz. per ton
4134B	Sulphide specimens	31' - 35'	1.30
5B	Country rock specimens	31' - 35'	0.02
6B	Sulphide specimens	35' - 40.5'	2.94
7B	Country rock specimens	35' - 40.5'	trace
8B	Sulphide specimens	40.5' - 42'	3.74
9B	Country rock specimens	40.5' - 42'	trace
4970A	D.D.H.#1 Sulphide specimens	50' - 53.5'	1.33
1A	D.D.H.#1 Country rock speci.	50' - 53.5'	trace
2A	D.D.H.#1 Sulphide specimens	53.5' - 58.5'	3.26
3A	D.D.H.#1 Country rock speci.	53.5' - 58.5'	trace
4A	D.D.H.#1 Sulphide specimens	58.5' - 64'	0.42
5A	D.D.H.#1 Country rock speci.	58.5' - 64'	nil

"D. E. Whittaker"

Provincial Government Assayer

Certified Correct Copy

"A.M.R."

Resident Mining Engineer.

APPENDIX #5.

Megascopic and Microscopic
report on core samples.

by J. S. Stevenson
Assistant Resident Mining Engineer
Victoria, B. C.

Appendix #5.

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Office of the Provincial Mineralogist

Department of Mines

VICTORIA

March 6th, 1936.

Report on Examination of Ore Samples
Nos. 4964 to 4975 inclusive and on Nos. 4063,
4072, 4079, 4099, 4108, 4113, 4124, 4126, as
submitted by A. M. Richmond, Resident Mining
Engineer.

A megascopic and partial microscopic
examination of the rock and sulphide fragments
did not solve the problem of whether or not the
samples had been salted by the introduction of
sulphide fragments.

The country rocks included greenstone
(fine and medium grained), medium-grained diorite
and limestone. The igneous rocks contained dis-
seminated sulphides, the greenstones mainly arseno-
pyrite and the diorite mainly pyrrhotite.

The fragments of heavy sulphides consisted
mainly of arsenopyrite, coarsely crystallized spal-
erite containing included chalcopyrite, and a little
pyrite and pyrrhotite. Irregular fragments of milky
quartz, up to 3/8 inches diameter, with adhering
sulphides, were inclusive, and in the specified samples
between 4063 and 4126. A thin film of oxidized material
frequently adhered to fracture surfaces of many of them.

In the sample lot Nos. 4063 to 4126, 1/8
inch cleavage fragments of clear calcite were occa-
sionally seen. It is interesting to note that the
sulphide fragments associated with the limestone
were themselves quite limy, although they contained
no visible calcite; this suggests that in this
instance the host rock for the sulphides was the
limestone.

Although the data obtained did not definitely solve the problem, the generalizations suggest that the samples were not salted by introduced sulphides.

Mineralization has not been confined to the heavy sulphide fragments; the igneous rocks have been mineralized by varying amounts of arsenopyrite, pyrrhotite and pyrite.

Experience shows that sphalerite and chalcopyrite do not commonly appear disseminated in country rock. The occurrence of milky quartz fragments and some calcite can be explained by the possible occurrence of quartz-calcite-sulphide veins or even replacement areas. A knowledge of the characteristics of mineralization as near as possible to sections traversed by the diamond-drill holes would help to evaluate the above thoughts.

The approximate sulphide content in the samples from Lot 4063 and 4123 is being determined by a sulphur and arsenic analysis; visual inspection would give a very poor approximation.

"John S. Stevenson"

Asst. Resident Engineer.

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Notes on samples as from a megascopic examination of core fragments and a microscopic investigation of the grains in the pulverized material. Note that the absence of material suitable for thin sections prevents accurate rock classifications from being made.

SAMPLE NO. 4964A (Sulphides)

Megascopic: Fragments consisting of 1, 2 or 3 of the following sulphides - arsenopyrite, sphalerite, with chalcopyrite inclusions, and pyrite. An occasional fragment of quartz with adhering sulphides is present.

Microscopic: The pulverized material consists of sulphide fragments, quartz, and fine grains of colourless amphibole and sericitized feldspar.

SAMPLE NO. 4965A.

Megascopic: This is very limy and may be either an impure limestone or carbonatized greenstone.

Microscopic: The pulverized material consists chiefly of calcite, with a few grains of feldspar, amphibole and quartz. A thin section would be necessary to attempt a classification.

SAMPLE NO. 4966A (Sulphides)

Megascopic: Same as Sample No. 4964A.

Microscopic: Abundant sulphides with a few quartz grains.

SAMPLE NO. 4967A.

Megascopeic: Silicified greenstone.

Microscopic: Mostly quartz with few grains of sericitized feldspar, chlorite, amphibole and carbonate.

SAMPLE NO. 4968A. (Sulphides)

Megascopeic: Same as Sample No. 4964A.

Microscopic: Abundant sulphides with quartz grains and small amounts of carbonate and amphibole.

SAMPLE NO. 4969A.

Megascopeic: Silicified greenstone.

Microscopic: Abundant quartz and carbonate with small amounts of amphibole and sericitized feldspar.

SAMPLE NO. 4970A. (Sulphides)

Megascopeic: Same as Sample No. 4964A.

Microscopic: Abundant sulphides and quartz, with very few amphibole and carbonate grains.

SAMPLE NO. 4971A.

Megascopeic: Silicified greenstone.

Microscopic: Abundant quartz, sericitized feldspar, and amphibole, only small amounts of carbonate.

SAMPLE NO. 4972A. (Sulphides)

Megascopeic: Same as No. 4964A.

Microscopic: Abundant sulphides and quartz.

SAMPLE NO. 4973A.

Megascopeic: Medium-grained diorite containing disseminated pyrite, pyrrhotite and arsenopyrite.

Microscopic: Sericitized feldspar (both plagioclase and orthoclase), brown hornblende, and a lesser amount of quartz.

SAMPLE NO. 4974A.

Megascopeic: No information.

Microscopic: Sulphides much less than in previous sulphide samples. Considerable quartz, feldspar and amphibole.

SAMPLE NO. 4975A

Megascopeic: Same as Sample No. 4973A.

Microscopic: Same as Sample No. 4973A.

The following samples are mixed sulphides and country rock:-

Most of the sulphides, mainly arsenopyrite, are -10 mesh, whereas the country-rock fragments are +10 mesh.

SAMPLE NO. 4063B

Megascopeic: Greenstone containing disseminated pyrrhotite and arsenopyrite. However, a few

SAMPLE NO. 4063B (cont'd)

of the greenstone fragments have abundant arsenopyrite. The sulphide fragments consist of (1) quartz - sphalerite - chalcopyrite; (2) quartz - arsenopyrite.

Microscopic: Grains are chiefly carbonate and quartz with fewer sericitized feldspar, amphibole and chlorite and sulphides.

SAMPLE No. 4072B.

Megascopeic: Coarse-grained diorite containing disseminated pyrrhotite and quartz-sulphide fragments; most of the sulphide is arsenopyrite and most of it is -10 mesh.

Microscopic: Sericitized feldspar (plagioclase and orthoclase) amphibole and quartz.

SAMPLE NO. 4079B.

Megascopeic: Light green, dense, highly siliceous rock, containing a little disseminated arsenopyrite, and fragments consisting of sulphides (arsenopyrite, pyrite, sphalerite and chalcopyrite) and quartz.

Microscopic: Chiefly quartz and feldspar fragments with a few sulphides.

SAMPLE NO. 4099B.

Megascopeic: Country rock similar to 4079B but sulphide is mainly arsenopyrite accompanied as usual by white quartz.

Microscopic: Mostly quartz-feldspar fragments with some colourless amphibole and sulphides.

SAMPLE NO. 4108B.

Megascopeic: Greenstone-country rock containing disseminated pyrite, associated with quartz-arsenopyrite and quartz-arsenopyrite-sphalerite fragments.

Microscopic: Mainly feldspar, amphibole, quartz and sulphides.

SAMPLE NO. 4123B.

Megascopeic: Medium-grained diorite, mineralization by sulphides is slight.

Microscopic: Sericitized feldspar, quartz and hornblende grains.

SAMPLE NO. 4124B.

Megascopeic: Country rock is fine-grained andesite, associated with numerous fragments of massive sulphides.

Microscopic: Grains of quartz, feldspar, amphibole and sulphides.

SAMPLE NO. 4126B.

Megascopeic: Country rock is a medium-grained diorite containing a little disseminated pyrrhotite and pyrite, sulphide fragments a few.

Microscopic: Grains of feldspar (plagioclase and orthoclase) quartz and green hornblende.

Notes on samples as requested on March 16th, 1936.

SAMPLE NO. 4092B. Crushed and pulverized portions of sample available.

Megascopeic: Probably a silicified greenstone and some quartz-arsenopyrite fragments.

Microscopic: Considerable quartz and hornblende, minor amounts of feldspar.

SAMPLE NO. 4051B. Only pulverized portions available.

Microscopic: Considerable sericitized feldspar (orthoclase and plagioclase), some quartz and hornblende, very little carbonate.

SAMPLE NO. 4057B. Same as Sample No. 4051B.

SAMPLE NO. 4965A. Crushed and pulverized portions available.

Megascopeic: Limy greenstone.

Microscopic: Grains are mostly carbonate, a few sericitized feldspar (some plagioclase) amphibole and quartz.

SAMPLE NO. 4967A. Same as Sample No. 4965A.

SAMPLE NO. 4099B. Crushed and pulverized material available.

Megascopeic: Light-green, siliceous rock.

Microscopic: Mostly quartz and feldspar laths with a little amphibole.
No pyrrhotite or garnet.

M A P I N D E X

H A - 1	-----	Claim Map
H A - 2	-----	Geological Map
H A - 2a	-----	Assay Map
H A - 3	-----	Mine Sections 1 to 8
H A - 4	-----	Drill Holes 1 to 4 Log and Assays
H A - 5	-----	Drill Holes 5 to 8 Log and Assays
H A - 6	-----	Drill Holes 9 to 11 Log and Assays