

The Yukon Consolidated Gold Corporation, Limited

INTER-DEPARTMENT CORRESPONDENCE

Dawson, Y. T.

November 8th, 1961.

From: B. W. HESTER

To: C. E. McLEDD

REPORT ON EXPLORATION WORK - NO. 21
16TH SEPTEMBER - 31ST OCTOBER, 1961

We examined a mineral discovery along the trail to Bedrock Creek, in the Sixty-Mile area. A large group of claims has been staked around the showing by prospectors from Fairbanks, who were active in this area during the summer. Rumour was that assay values in excess of \$30 per ton were obtained from combined copper-nickel-platinum mineralization. Small amounts of platinum have been recovered in placer work in the Sixty-Mile area. We were directed to the showing by O. Medby, of Miller Creek. Patches of green stain are distributed erratically near the contact between a serpentinized ultra-basic rock and a quartzite. An assay of selected pieces of well stained material is as follows:

Platinum - trace; Copper - 0.03%; Nickel - 0.15%

Between 12th and 28th October I visited the beryllium occurrences at Spor Mountain, Utah, and the Eagle Mountain Iron Mine of Kaiser Steel at Desert Center, California for Consolidated Zinc Corporation. During this period I visited a number of mineral occurrences to which our attention had been drawn by a W. Cook, of Creston, B. C. It was not possible to form an opinion of a lead showing which we were offered, on account of the nine inches of snow on the ground. Those veins which were visible were only a few inches wide, and the property was clearly an old one. The other lead showing, and the two copper showings were of very narrow, low-grade mineralization which had been well exposed in old trenches.

The churn drilling to check the seismic results in the Granville area began on the 16th of the month, and is continuing. Due to mechanical troubles and unexpected thawed ground, only 77 feet were drilled. All holes drilled so far have been abandoned before the horizon of interest has been intersected. The cost per foot of this work to the end of October is \$25, which does not include the cost of Parker's participation or the cost of transporting him to Granville. These costs are about three times those expected. I strongly recommend that the programme of drilling be terminated forthwith, and consideration be given to a resumption in the spring with contract labour.

While in Whitehorse to meet Messrs. Connor and King at the end of September, I learned that the Yukon Chamber of Mines there had held a meeting with representatives from Ottawa, at which proposed changes in the Quartz Mining Act were discussed. Invitations to attend this meeting were sent to all Territorial Representatives, Mining Recorders, the manager of United Keno Hill Mines, Ltd., and G. Hickey, of Klondike Lode Gold, Ltd., but not to our Company. The wording intimated that suggested changes in the Placer Act were also invited. The invitations which were sent to Dawson arrived only the day before the meeting. Similar meetings have also been held in Vancouver under the auspices of the B. C. and Yukon Chamber of Mines. We were not invited initially to participate in these either, although this has now been rectified. The Dawson Mining Recorder has undertaken to make a separate submission to Ottawa, via the Yukon Chamber of Mines in Whitehorse. We shall have the opportunity of identifying ourselves with this submission. If we do no more than reiterate points submitted by others, we shall have at least established our interest in something which is vitally important to us.

At a further meeting at Whitehorse, which I attended, the new Prospectors' Assistance Programme was described. The attached copy is self-explanatory. Should there not be enough requests for this assistance from individual prospectors, the scheme might be extended to qualified companies. Details of the scheme have not yet been promulgated.

At the suggestion of Mr. Connor, I approached Mr. G. Campbell, who had been in charge of work on the Bellekeno property this year. He is very familiar with the Keno camp, and has undertaken to bring a number of situations, of which he has knowledge, to our attention when he returns from the east. He had hoped to secure a contract for underground work at the Peso Silver Mines property, but was unsuccessful.

Our Company was not among the forty-seven mining companies which advertised in the Fall issue of "The Western Miner". Every aspect of mining in the Yukon is given a liberal mention in the text, with the exception of our own operations. If we expect properties of merit to be submitted to the Company, we must advertise the fact more widely through the technical press. I am sure that the attitude of indifference we are taking at present is reflected in the very low quality of the properties submitted to us.

B. W. Hester

B. W. Hester,
Assistant Manager.

BWH:w

cc: CEMcL-6
AGB
DO

The Yukon Consolidated Gold Corporation, Limited

INTER-DEPARTMENT CORRESPONDENCE

Dawson, Y. T.

September 20th, 1961.

From: B. W. HESTER

To: C. E. McLEOD

BI-MONTHLY REPORT NO. 20
1ST - 15TH SEPTEMBER, 1961

Field mapping in the Granville-Indian River area has now ceased.

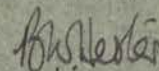
Employment of our assistant has terminated. The summer's work is now being draughted into presentable form.

I visited the mineralization on a group of claims in the Ogilvie Mountains, at the head of Fifteen-Mile River, which are held by a syndicate of local people. The mineralization consists of chalcopyrite in siderite veins. The showing, as exposed, is completely worthless. That 32 claims were staked around it emphasizes the complete lack of even rudimentary knowledge of mineral occurrences of the various syndicate members.

On the return trip I examined the silver-lead showings in Spotted Fawn Creek, at the head of the Twelve-Mile, or Chandindu River. From the government reports, this showing is one of the few attractive ones in the Ogilvie Mountains. Deep trenches and adit workings on the vein have all caved. It is now impossible to see any mineralization in situ. In the short time I spent in the vicinity of the showing, I could see no signs of much prospecting.

All members of the various G.S.C. parties have now left the area, with the exception of the party which is engaged in mapping the Ogilvie Mountains.

We have been invited to examine the property of Hanna Gold Mines, Limited, in the McDame area. Spectacular, but erratic, gold mineralization has been known there for many years. The Hanna company is conducting underground work, in the hope that mineable zones will be indicated.



B. W. Hester,
Senior Geologist.

BWH:sw

cc: CEMcL-6
AGB
DO

The Yukon Consolidated Gold Corporation, Limited

DAWSON, Y.T.

CANADA

NOTES ON LEAD-ZINC-SILVER ORE OCCURRENCES IN GALENA-KENO HILLS, MAYO DISTRICT

INTRODUCTION:

These notes are based on the published material on this mining district (see bibliography), personal observations during several short visits to some of the more important properties, and conversations with geologists and engineers well acquainted with the district.

REGIONAL GEOLOGY:

The only map showing the regional geology is one prepared by Bostock, of the G.S.C., in 1938-41, and published in 1946, on a scale of 1 inch to 4 miles. He classified all the rocks of the area as "Yukon Group", that is, possibly Precambrian. This group comprises interbedded quartzites, schists-phyllites, and minor limestones, all of which have been intruded by irregular-shaped masses of diorite. Regional metamorphism is said to be of green schist facies.

Bostock recognizes two major open anticlines in the area. One plunges to the southwest at a low angle; the other to the south-south-east at a low angle. Lead-zinc-silver mineralization of economic significance occurs in vein systems in the southern quadrant contained by these fold axes.

Between 1953 and 1955 Boyle examined the geology and geochemistry of the ore deposits for the G.S.C. He accepted Bostock's interpretations of the regional structure, and prepared a detailed map of the mineralized area. This is the only detailed surface map of the geology of the camp.

Roddick and Green, both of G.S.C., mapped a number of areas on the fringe of the camp between 1951 and 1957. In their joint paper to the Geologists' Association of Canada they present a very different view of the regional structure. They accept the southwest plunging anticline, but consider it to be the root of an isoclinal structure. They propose a wide zone of faulting with a scissor movement at the east end of the camp. The ground east of this they consider to be a rotated block. They present a synthesis of a great number of detailed observations of structures, both minor and major. As an alternative interpretation of their observations they offer the suggestion that there might be thrusting from the south, with greater resistance to the east than to the west. Boyle makes no mention of either of these interpretations in his publications, but accepts that of Bostock.

ORE AND MINERALIZATION:

More or less argeniferous galena, sphalerite, greenockite (cadmium sulphide), freiburgite (an argeniferous grey copper mineral), and various oxidation products occur in a gangue of siderite with minor quartz, pyrite, and calcite in openings along faults. The preferred country rocks for these openings are quartzite and diorite. In the schist and phyllites the fractures degenerate and are tight.

Barren cross faults at right angles to the ore-bearing faults are a typical association. Movement on the ore-faults is said by Boyle to be normal in many cases. In several of the ore bodies at the Calumet Mine of United Keno Hill Mines, Ltd., and again in the Davidson Range veins, I observed many near-horizontal slickensides, so there is the possibility of either two types of opening occupied by ore, or two types of movement along the fractures. The barren cross faults are poorly exposed underground, due to the close timbering in all workings which cut them. Movement is mostly horizontal, or nearly so, in these faults. Movement is thought to be mostly post-ore by Boyle, but the original openings are thought to have been earlier. From all appearances, both faults and vein faults have a complex history of movement. Where a cross fault cuts a system of vein-faults a symoidal loop is frequently seen in the pattern of the latter. This, with the frequent disposition of ore at cross faults, might indicate a conjugate origin for the two directions. If this interpretation be accepted, then many of the known ore centres line up on intersections of the two tensional directions complementary to this shear pattern.

On the basis of experience in several of the small, high grade ore bodies which were worked early in the history of the camp, Wernecke concluded that ore would not extend to any depth. He postulated a depth of 500 feet for the termination of all ore. This idea has been tenuously held until quite recent developments at United Keno have shown that ore not only extends to depth but changes in character, with less argeniferous galena and more freibergite. Development is now in good ore on the 900 level at the Calumet mine. The changes in ore with depth are well demonstrated by the following figures, calculated from the United Keno Hill annual report for 1960:

<u>YEAR</u>	<u>LBS. LEAD FOR 1 OZ. SILVER</u>	<u>LEAD/ZINC</u>
1954	5.0	1.17
1955	4.8	1.09
1956	4.5	1.04
1957	3.9	1.25
1958	3.7	1.19
1959	3.1	1.29
1960	3.0	1.52

The trends are well demonstrated, although they are, to some extent, masked by the practice of drawing ore from a number of sources during the year. For many years the silver-lead ratio has been regarded as an inviolable measure for appraising ore. This no longer appears to be true.

Little consideration has been given by workers in the field to the genesis of the deposits. Such granites which intrude the Yukon Series are of supposed Mesozoic age, but no worker has ascribed the ore to these. Minor quartz porphyry sills are mentioned by Boyle. The diorite bodies are generally considered to be pre-folding. Boyle mentioned to me in a conversation that he felt that the sulphides were probably syngenetic in the graphitic schists, and had migrated to their present site along the fractures in the competent rocks. He offered no evidence to support this contention, but he is a confirmed, avant-garde syngeneticist. There are stories of minor galena occurrences in these schists, quite apart from any veining. Quite fortuitously I encountered an outcrop of a quartz-siderite rock in the lower schist. The rock type seemed fairly extensive, yet there is no mention of it in any publication on the area which I have read. The presence of siderite, both in iron formation, if such this is, and the veins, is suggestive of a hypothesis akin to that of Boyle.

GEOLOGICAL EXPLORATION ACTIVITIES IN THE CAMP:

Any activity by the smaller operators in the camp is entirely eclipsed by that of United Keno Hill Mines, Ltd., which dominates the camp, both in production and land holdings. (See my "Claim Groups and Mineralization in Keno Hill-Davidson Range Area" map). I was most surprised to learn that the only comprehensive surface geological map the United Keno Hill geology department had was an enlargement of Boyle's, with only a few additions. All exploration work by this company is directed towards the development of ore in their known ore zones. Between four and five geologists are employed full time on mine geology. Those records of this work which I was shown were, without exception, excellent. Such surface work that the company has carried out on its own account has been in a desultory manner in summer months. This year nothing has been done away from the property or on the surface. Last year a little geochemical work was tried, without success. For a synthesis of the geology of the camp, United Keno, like the smaller operators, relies entirely on the word of Boyle et al. of the G.S.C. No other company in the area retains a geologist, so far as I could ascertain.

There is good reason to expect that the United Keno Hill Mines, Ltd. attitude towards exploration strategy will change shortly, as a result of the change in direction of the company which took place last year. Conwest Explorations, Ltd. now has no share in management; this function is entirely under the aegis of the Ventures-McIntyre Group, which may be expected with confidence to develop its position to advantage. Ventures, Ltd. now holds 47.9% of the outstanding United Keno Hill Mines, Ltd. shares.

Boyle made a study of the vein system at the Belle Keno property as part of his work. On the basis of his interpretation of the offset on one of the faults, Newmont has taken a 51% interest in exploration work on the property. The work is directed towards the supposed offset part of one of the known veins. At the time of my visit this offset had not been found in the cross-cut, and a number of drill holes were planned as a last resort. Here again, the only geological maps which I was shown were by Boyle.

Several of the smaller properties in the camp are being profitably leased by individuals.

W. G. Stevenson, of Asbestos Corporation, with whom I spent some time in the camp, has had some experience in the Coeur d'Alene area in Idaho. At present this is the most prolific silver producing camp in the United States. Stevenson remarked on the very many similarities between the two camps. Similarities include age and facies of country rock, association of ore with wide faults, and almost identical mineralogy of the ore.

It is interesting to note that, in recent years, knowledge of the ore controls in the Coeur d'Alene area has become sufficiently refined to allow the selection of exploration targets on geological reasoning alone. The result has been the discovery of excellent ore, often at great depths. The applicability of similar techniques to the Keno-Galena Hill area is clearly indicated. All the known ore bodies in this camp have been discovered at surface or, by accident, underground.

CONCLUSIONS:

1. The control of ore in the Keno-Galena Hill area appears to be primarily structural. Few attempts have been made to compile the detail obtained in mining to a camp-wide synthesis. Any such synthesis would have to fit into the regional structural geology, knowledge of which at present is imperfect, and allows several very different interpretations. The one attempted by Boyle is the most complete, but it is developed as a corollary to only one of the possible interpretations of regional structure.

2. On the basis of recent experiences in the camp, and comparison with the Coeur d'Alene area, there is good reason to suppose that ore of good grade may be expected to continue to greater depth than was previously thought, and that the discovery of such ore might be expected to follow an understanding of the geological structure of the camp.

3. The camp grade of ore bodies found in the Keno-Galena Hill area is sufficiently high to permit continuous economic exploitation. This is a unique condition in the Yukon, and a prima facie reason for any company which retains mineral exploration in the Yukon as a policy to give careful consideration to working in this area.

4. Any decision to work in the Keno-Galena Hill area should take into account the unusual surface conditions brought about by frost action, the extensive land holdings of United Keno Hill Mines, Ltd., and fairly high operating costs.

B. W. Hester

B. W. Hester,
Senior Geologist.

Dawson, Y. T.
September 25th, 1961.

cc: CEMCL-6; AGB; DO

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CARMICHAEL, A. D. Structural Geology of Canadian Ore Deposits - Volume 2; Pages 66-77.

GREEN, L. H. and McTAGGART, K. C. Structural Studies in the Mayo District, Yukon Territory - Reprint 26, 1961, from Proceedings of Geological Association of Canada - Volume 2, Pages 119-134, December, 1960.

BWH:sw

The Yukon Consolidated Gold Corporation Limited

DAWSON, Y.T.

CANADA

NOTES ON THE VALUATION OF GOLD PLACER GROUND IN THE KLONDIKE AREA

INTRODUCTION:

In the report of his visit to the Yukon Consolidated Gold Corporation operations in 1953, Mr. H. F. King expressed concern over the disparity between drilling and dredging results, and suggested a review of the evaluation methods used, in the light of experience and recent advances in statistics. This, he felt, could lead to improvements in the delineation of ore reserves.

Mr. A. Nordale, in his 1957 "Study of the Company's Operations", drew attention to the same problem in his reference to Dredge 9 performance on Sulphur Creek. He noted the tendency to over-run coincided with low estimates, while the converse was true for high estimates.

Similar observations were made by Mr. E. Dawson in his report on the Company's operations in 1953. He attributed the poor correlation between estimates and recovery to an insufficiency of holes. These problems are common to any mining enterprise; their exact resolution is a very difficult task.

The procedure in forecasting performance of any repetitive event is divisible under four headings:

1. Assemble data.
2. Forecast.
3. Compare forecast with results.
4. Refine technique of forecasting.

These notes are concerned primarily with these last two headings. Any improvement in valuation ability would lead to better control of immediate operations and the better planning of long term activities. It is with these objectives in mind that these notes have been prepared. They are intended, primarily, to be a progress report. Conclusions and recommendations should be interpreted in this light.

EVIDENCE OF DISTRIBUTION OF GOLD FROM DRILL-HOLES

It is an observed fact that the distribution of the valuable material within most mineral deposits follows one of the distributions commonly encountered in statistical analysis. With this in mind, the frequency of occurrence of "cents per cubic yard" values of gold have been plotted from the results of 1,750 holes in the Quartz, Sulphur, Dominion and Granville examinations. The results are given in Graph 1 (q.v.), where logarithms of the two functions have been plotted in order to obtain a straight line relationship. A definite interruption in continuity is evident in the distribution of values greater than 4.5 (\$1.60 per cubic yard at \$35 gold or 90¢ at \$20 gold).

Thus, from the evidence of 1,750 holes, a limit can be established, on a scientific basis, beyond which values obtained become suspect. About 7.4% of the total fall into this latter division. Treatment of anomalous values has long been a contentious subject. In our own case they may result from a number of causes, among which are pay streak remnants left by old workings, a poor drilling practice, or normal sampling error. Whatever their cause, or causes, estimates involving values in this "anomalous" range warrant special attention.

Test work has shown that the actual recovery of gold by a dredge is, for practical purposes, 100%. Production from each dredge is known for each month of operation, consequently there is a ready method of measuring the effectiveness with which the drill holes within any monthly cut predicted the actual recovery. To test this idea, the frequencies of values, on a basis of dollars per square yard of bedrock, from both dredging and drilling operations have been plotted (Graphs ll and lll). A substantial bias error appears to exist between the two sets of results, which is especially noticeable in the lower range of values. The smaller peak on Graph ll is due to the effect of results from Dominion Creek in which there are apparently two separate modes of value distribution.

COMPARISON OF RECOVERIES WITH ESTIMATES

The annual recovery to estimate ratio ($\frac{R}{E}$ factor) for many of the dredge operations varies widely from the optimum 100%. Fundamentally, this ratio does not express the efficiency of the dredging, but is a measure of the precision of the evaluation procedure. As such, its variations deserve careful attention.

Performance of Dredge 7 on Quartz Creek has been used to support the contention that, because the overall $\frac{R}{E}$ for this operation was nearly 100%, the same will hold true for other operations as they progress. This argument is largely academic, since the major purpose of the valuation is to guide operations over much shorter periods. It is interesting to compare the frequency with which the values greater than \$1.35 per cubic yard occur in the creeks considered in Graph 1 :

<u>Creek</u>	<u>Total holes Considered</u>	<u>%Greater than \$1.35/cu. yd. (\$35 gold)</u>
Quartz	177	4.5
Sulphur	662	7.7
Dominion & Granville	911	7.8

With so many more "anomalous" values in the examination of Sulphur, Dominion and Granville than Quartz, and the current practice of estimating reserves strictly on the drill hole values, it will be interesting to see how this contention is upheld.

From Graphs ll and lll there is evidently a bias, which is more marked in the lower values. It therefore seems logical to examine the spread of R/E factors in suitable ranges of estimated values. To do this the annual R/E factors for 126 seasons' operations have been grouped according to the estimated recoveries in ten cent divisions (Graph lV). A smooth curve

joins the average of each group, although there is a considerable spread of R/E factors within each group. In order that the amount of spread may be appreciated graphically, the area containing two-thirds of the R/E factors in each range of estimated values has been plotted on Graph IV. Thus there is roughly a 2 to 1 chance that the R/E factor obtained by dredging ground of any given estimated value will fall within this area.

Were estimates made of monthly recoveries, it would be possible to refine this technique by virtue of the much larger number of R/E factors and estimates available. Even so, there seems to be a good case for adjusting estimates in accordance with the trends of the graph. The R/E factors from Graph IV would then be used as plan factors to be multiplied by the value of the estimate arrived at from the drilling, and so arrive at a more precise valuation.

In that estimates would then fulfill their intended purpose as an aid to planning and control, a device such as that outlined would surely be more acceptable than the present practice of adjusting estimates arbitrarily by large percentages in the making of production forecasts for budgeting. The use of carefully calculated plan factors would employ all the accumulated knowledge of valuation variation and thus ensure, on average, a better control of operations.

The manner in which present valuation estimates are adjusted for forecasts may be appreciated from the following table for 1960:

DREDGE	Pre-Season	Adjustment	Adjusted	Post-season	Actual
	Estimate of Planned dredging		Pre-Season	Estimate of	
	d/CU.YD.	%	d/CU.YD.	Actual dredging	Recovery
				d/CU. YD.	d/CU.YD.
6	25	N11	25.3	26.8	29.4
8	35	+10	38.5	36.2	53.0
9	15	↓25	19.3	18.3	38.3
10	20	↑25	25.0	25.0	48.1
11	62	-10	59.4	65.5	68.9

With adjustments of this magnitude being made arbitrarily to estimates of ground value, there is clearly little justification for the current practice of giving estimated values to five and six significant figures. Such a degree of accuracy could not be expected from plan factors either. The R/E factor, as calculated at present, is put to no real use, since the "E" used is that derived from the drilling results, while the only "E" used in making any decisions is that which has been "adjusted" in the manner outlined above.

In the R/E estimated value curve in Graph IV the lower limit of the area containing two-thirds of the values shows a downward trend in the range of lower estimates, which is a deviation from the symmetry of the distribution. An examination of the individual values of R/E in this lower range of estimated values shows that they are predominantly from Dredges 3, 4 and 6. Both Dredges 3 and 4 were working in abnormal ground,

which had either previously been worked or was in the main Klondike Valley, so any unusual deviations in valuation precision are readily explicable. Until recently the performance of Dredge 6 has been enigmatic. If R/E factors outside the area containing 2/3 of the values be termed "anomalous" for the sake of the argument, then the extents of the deviations by Dredge 6 from expected performance may be judged from the following table:

<u>Dredge</u>	<u>Number of years "anomalous" performance - 1949 - 1960</u>
6	9
8	2
9	1
10	2
11	1

No geological reason is evident in the records for this unusual performance. The only possible conclusion is that the deviations from the expected are, in some way, a function of the method of evaluation. In 1954, after four "anomalous" years out of five, the remaining part of the reserves of Dredge 6 which had been valued by widely spaced holes were revalued by a weighting method evolved by Mr. W. H. S. McFarland. Even this did not ameliorate the situation markedly. When the original evaluation of drill holes in this area is used, it is noticeable that Dredge 6 performance did not cease being "anomalous" until after 1959, when the last of the widely spaced drill hole area was finally reached.

From the above considerations, the amendment to Graph IV seems to be justified (q.v.).

CONCLUSIONS AND RECOMMENDATIONS

1. A statistical approach to the evaluation of drill holes shows that there is a well defined upper limit to the value per cubic yard which, where exceeded, should be suspect.
2. The existence of a bias error has been demonstrated in correlating monthly dredge returns with drill hole evaluations of the same area.
3. The variations in recovery to estimate factors in respect to estimates from drilling of the value of dredge ground show that a definite correlation exists. Adoption of plan factors for adjusting valuations based on drill hole data is suggested as an alternative to present practice.
4. It is recommended that the recovery to estimate factors be calculated for as many months' dredging as feasible, and that this information be used for determining plan factors as accurately as possible.

CONCLUSIONS AND RECOMMENDATIONS (Cont'd.)

5. With the drill hole information, accurate plan factors, and a knowledge of the stripping, thawing and dredging costs for different depths of material, it would be possible to calculate the optimum reserves for each dredging operation. This might be best effected by a small electronic computer programme in much the manner of current practice in many open-pit mining operations today.

B. W. Hester

B. W. Hester,
Senior Geologist.

DAWSON, Y. T.
May 1st, 1961.

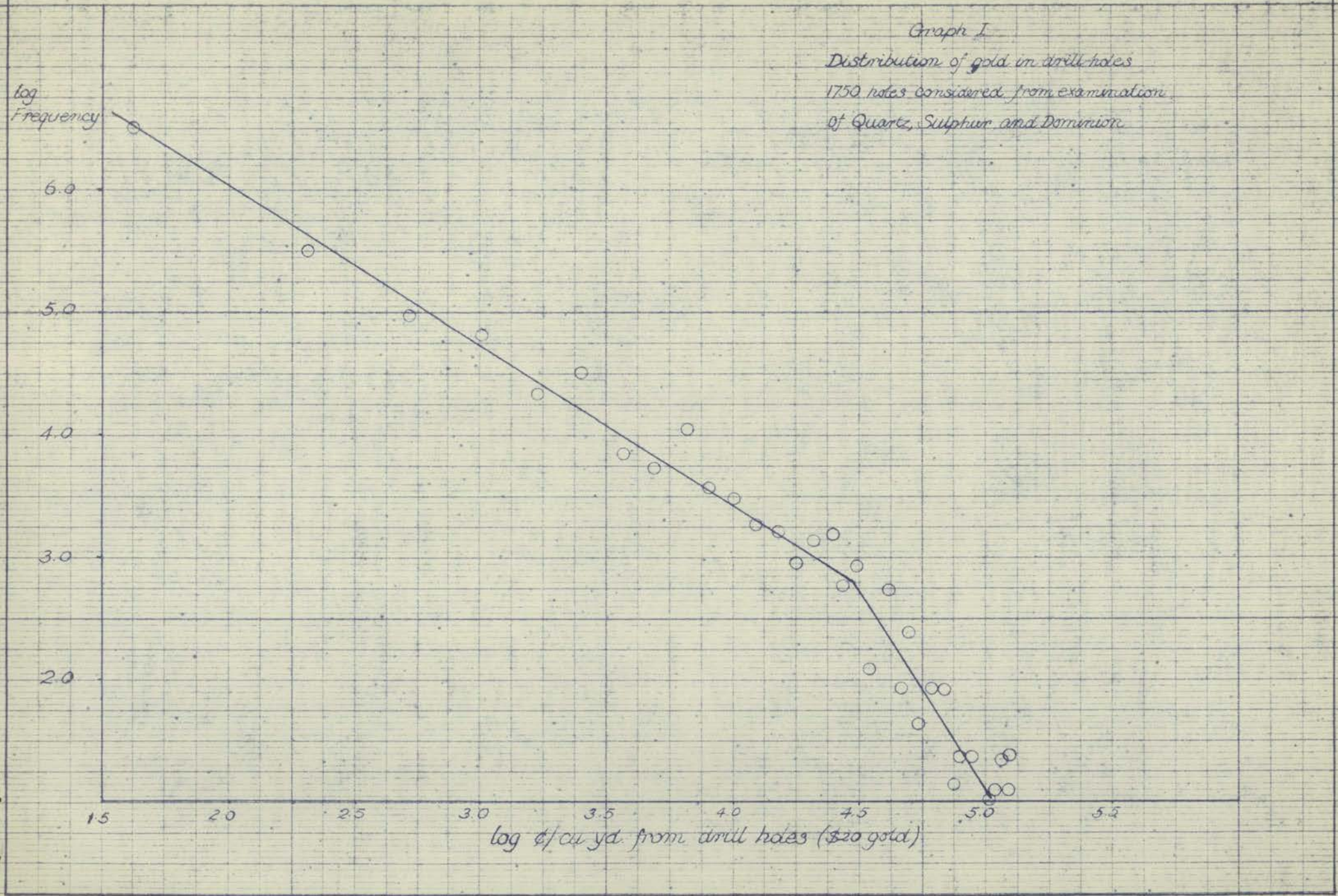
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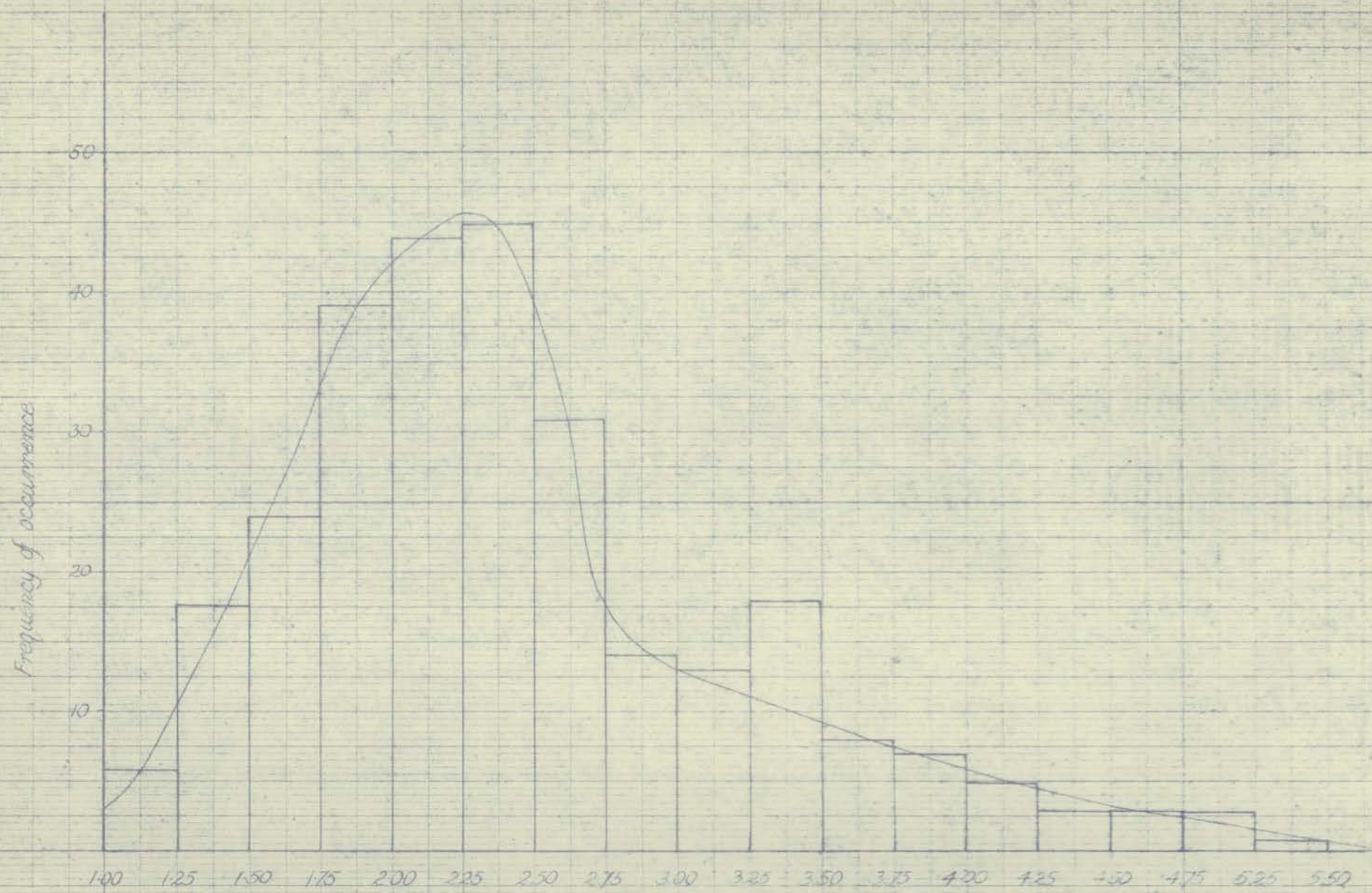
Graph I
Distribution of gold in drill holes
1750 holes considered from examination
of Quartz, Sulphur and Dominion

log
Frequency

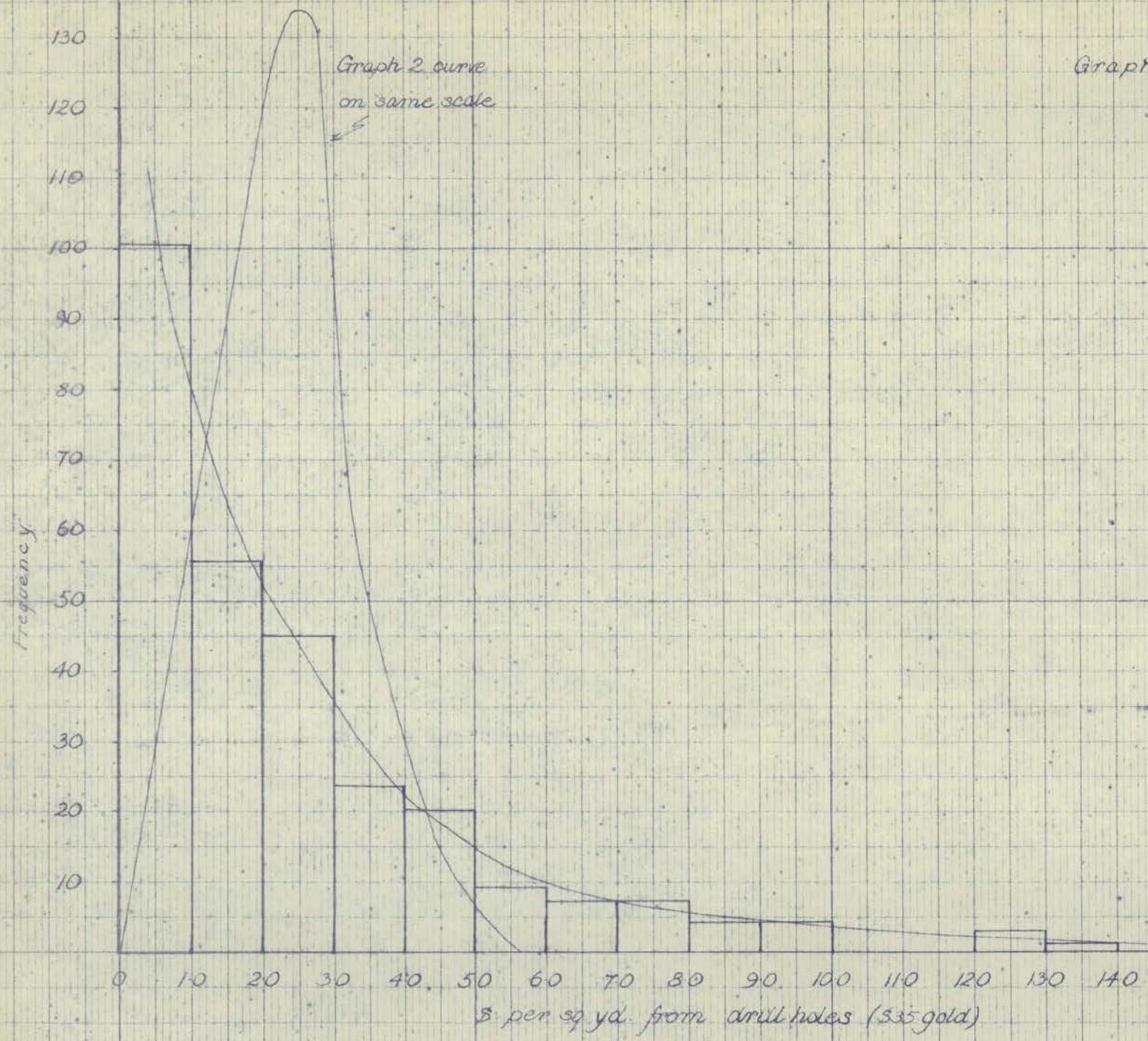
log \$/cu yd. from drill holes (\$20 gold)



Graph 2



Drillhole values from monthly average returns 3 per sq. yd (335 gold)
values from Drays 6 2 3 2 10



Graph 4

126 Estimates of value per cubic yard
and Recovery to Estimate factor ($\frac{R}{E}$)
obtained on average. Two-thirds of
the $\frac{R}{E}$ factors lie between limits shown.



The Yukon Consolidated Gold Corporation Limited

DAWSON, Y.T.

CANADA

January 27th, 1961.

THE EFFECT OF VARIATIONS IN BULLION FINENESS ON THE EVALUATION OF GRAVELS

With the exception of a few minor creeks, the range in fineness of the Klondike gravels is between 600 and 850. Much information on fineness is readily available from old reports and Mint returns.

Three frequency of fineness distribution curves have been prepared from Mint returns for the period 1945-1960, inclusive. One curve is for the period 1945-1956, a second for the period 1957-1960, and the third is for the whole period. Copies of these are appended. While the curve for the earlier period cents to the right, the curve for the later period cents to the left, a feature which would indicate that, although the range of finenesses remains dominantly the same, there is considerable variation in the frequency of occurrence of a particular fineness within this range over a period of time. The double peak is well defined on all three curves. This is an unusual feature, the significance of which is not clear. A possible explanation of the change in cent is that a number of dredges ceased operations during the earlier period. It should be noted that the fineness determinations on which these graphs are based were not made on bars made separately from the product of each dredge, but on bars made from the combined product of all dredges.

Monthly dredge production figures, combined with drill hole data, provide an excellent basis for the study of concentrations of gold values in the ancient stream channels, and permit a comparison between actual and estimated recovery by the dredges.

In recent years it has not, for economic reasons, been the practice to pour separate bars from the product of each dredge, so it is pertinent, both for a study of the distribution of gold values, and for the comparison of estimated with actual production, to examine the manner in which the overall gold production is distributed among the various operations on the property. The procedure employed is as follows:

1. The gold dust recovered from each operation is weighed separately before being combined for melting.
2. The number of fine ounces of gold recovered and reported by the Mint from each shipment is then distributed between the operations, in proportion to the ounces of dust recovered from each.
3. This figure of "distributed bullion ounces" is then multiplied by a "value factor", which differs for each dredge, and which takes into account variations in fineness of the gold dust recovered from the different dredges.

Value factors for the dredges in operation at present are:

<u>DREDGE</u>	<u>VALUE FACTOR</u>
6	1,081.70
8	1,024.64
9	1,010.24
10	1,040.57
11	1,008.77

For bench operations, the factor for the nearest dredge operation on the same creek is used.

- The total mint return in dollars is then distributed among the various dredges in proportion to the products obtained by multiplying the "distributed bullion ounces" by the "value factor", as outlined above.

Clearly, the validity of the value factor is all-important for the proper functioning of this procedure. (see Appendix). The basis on which these factors were calculated is not now available, but it may be assumed that, at the time, they represented some kind of an average from each operation. In a report entitled, "Stripping, Thawing, Dredging, 1942 to date", the fineness of gold from each dredge is reported. By dividing the fineness given for Dredge 11 by that of Dredge 2, the exact figure of the value factor at present in use for Dredge 11 is obtained. Value factors for the other dredges are not derivable by the same process. Thus, the calculations were probably performed nearly 20 years ago, and for this reason alone it would seem prudent to check the fineness of the dredge products again at an early date. Several dredges, active when the factors were calculated, have now ceased operations, so the value of the factors relative to each other must also have changed considerably.

Clues to the magnitude of these changes are provided in the returns from the dredging of "lay" ground, when the gold dust recovered is made into bars separately, so that the owners of the ground may be compensated exactly. Mint returns on these bars provide such information. The finenesses of such bars have been averaged, and are included in the following table:

<u>DREDGE</u>	<u>VALUE FACTOR</u>	<u>FINENESSES FROM MINT RETURNS</u>	
		<u>1945-1956</u>	<u>1957-1960</u>
3	-	793.4(2)	-
4	-	775.5(10)	-
6	1,081.70	822.4(5)	-
8	1,024.64	815.8(17)	824.8(9)
9	1,010.24	805.4(12)	786.5(6)
10	1,040.57	825.2(3)	-
11	1,008.77	816.7(8)	754.4(29)

(Numbers in brackets indicate number of samples.)

(Blanks indicate the number is not available, or that dredge was not operating.)

Although these figures for the finenesses of the various areas can hardly be considered completely representative, they do at least give an indication of the variations which are possible. For instance, by using the finenesses obtained from lay ground assays, the indication is, that while the production from Dredges 8 and 11 has been valued in the proportion of 1,024.64 to 1,008.77 (the value factors for these two dredges), or 1.016 to 1, during the period 1945-1956, 0.989 to 1 would have been a closer approximation to actual performance, and 1.093 to 1 is possibly a better ratio for 1957-1960.

Variations of the order of magnitude indicated above are not of any consequence so far as geological considerations are involved. However, their effect on the evaluation of gravel may be more important.

Quite another influence of fineness on gravel evaluation stems from the appraisal of drill results. Apparently a constant figure of gold fineness has been used for all the holes in each creek. For Dominion and the Granville area, a fineness of 830 has been used, while for the rest of the creeks now being dredged, 800 is used. An example of possible variations is again provided by the performance of No. 11 Dredge. On the assumption that all other estimates are 100% accurate, the difference between fineness figures used in the estimates and the fineness of material actually dredged would, for the period 1957-1960, be responsible for an average recovery over estimate figure of 94.25%, i.e. $\frac{754}{800} \times 100\%$.

The recovery to estimate ratio, calculated from reported figures for this period, is 119.27%.

Without a knowledge of the degree of accuracy required from the data, it is impossible to estimate the extent to which these variations in fineness will influence the statistical investigation which is to be carried out under Mr. King's direction. There seems to be a good case for a series of fineness determinations on the dredge products at an early date.

B. W. Hester

B. W. Hester,
Senior Geologist.

BWH:w

Attach. 1

cc: CEMel-6
DO

APPENDIX

AFFECT OF VARIATION IN VALUE FACTOR OF A DREDGE

Let Dredge "N" produce dust of weight D_N .

and value factor for Dredge "N" be f_N .

and total ounces fine bullion produced by all dredges be B.

The distributed bullion from Dredge N equals

$$\frac{D_N}{\sum D_N} \cdot B \text{ ounces}$$

multiply by value factor

$$\frac{D_N}{\sum D_N} \cdot B \cdot f_N$$

and weight of bullion from Dredge "N" is B_N , or

$$\frac{\sum D_N}{\sum D_N \cdot B \cdot f_N} \cdot B \cdot \frac{D_N \cdot B \cdot f_N}{\sum D_N}$$

$$\text{or } \frac{B \cdot D_N \cdot f_N}{\sum D_N \cdot f_N}$$

let f_N vary, and all other values of f , and D remain constant

then B_N equals

$$\frac{B \cdot D_N \cdot f_N}{\text{constant} + D_N \cdot f_N}$$

which may be simplified to the form

$$B = Q \cdot \frac{f}{R + f} \quad \text{where } Q \text{ and } R \text{ are constants, } R \text{ being proportional to the average fineness of the other dredges,}$$

$$\text{and } \frac{1}{Q} \cdot \frac{dB}{df} = \frac{1}{(R + f)^2}$$

That is, for any change in the value of the fineness of gold produced from any dredge, the value of the bullion produced changes as the inverse of the square of the fineness.

September 12, 1960.

From: W. Parker

To: Mr. C.E. McLeod

REPORT on EXPLORATION ACTIVITIES
July 23 to September 11, 1960

ANTIMONY MOUNTAIN

On July 29 an air-drop was made on Fish Creek near the mouth of Walker Creek.

The trip from the North Klondike (at Mile 26 on the Aklavik road) to Antimony Mountain was made on July 29 and 30. A camp was set up on Fish Creek about $\frac{1}{2}$ mile below the mouth of Walker Creek. About 95% of air drop was recovered with no damage to anything.

The mountain was found to be badly broken up and work was hampered by rain, sleet and snow. The Stibnite vein was not actually seen at any point but stibnite float was found in slides on three sides of the mountain. The trace of a vein was found over more than 1000 feet in slide and high grade float more than one foot in diameter was found in several places. Evidence of a second vein of similar size was found about 500 feet to the west of the first vein. Several boulders in the slide on the Walker Creek side of the mountain contained small veins of stibnite 1 to 2 inches wide.

Four claims were staked adjoining the two that were staked in June. The return trip was made on August 16 and 17.

The above claims were recorded by mail from Vancouver and no confirmation on the recording has been received.

RECOMMENDATIONS:

It is recommended that a surface trenching program be undertaken next summer to test the width, extent and grade of the veins. Such a program could be started about July 10 of an average summer and continued until about August 15.

KAMLOOPS AREA: August 18 - August 29, 1960.

Left Dawson by plane on August 18 for Vancouver. A few days were spent in Vancouver and arrival in Kamloops was on August 22. Two copper prospects and a gold prospect were examined before returning to Vancouver on August 29.

Careful sampling of the gold prospect showed no gold values. Assays correspond to Nos. 16201-16203 on the Eldridge Assay Report of September 6, 1960. The reported assay from the same vein gave a value of more than \$900.00 per ton; the sample must have been carefully picked. The vein was narrow, about 6" wide, and visible over only a few feet. It is recommended that no further interest be taken in this property.

The above gold prospect and the following copper prospect are located just north of the Trans-Canada Highway about 35 miles west of Kamloops. They are on the same property which is held by Bain Grant and Johnny Ashdown.

Samples taken from the main parts of a chemical soil sampling anomaly, on the above property, showed only minor assay results for copper. Assays correspond to Nos. 16209-16215 on the Eldridge Assay Report of Sept. 6, 1960. It is recommended that no further interest be taken in this property.

The most interesting and only promising property was a copper-gold workings on the north shore of Kamloops Lake near the C.N.R. station of Copper Creek.

A small crown grant, the Tenderfoot Claim, covers these old workings and is held by K.R. Rosseau of Copper Creek. Six other claims are held by Bain Grant and Johnny Ashdown.

Assay results from veins correspond to Nos. 16216, 16213, 16220, 16221, 16222 and 16223.

Further work will be done and a complete report and recommendations will be submitted.

KAMLOOPS AREA: Sept. 3 - Sept. 7, 1960.

Three adjoining copper and gold mining properties near Kamloops were visited with Mr. John Ashdown and Mr. Eric Larsen. Mr. Larsen is an official of Kamloops Copper Syndicate. The three properties were Kamloops Copper, Galaxie and Nakao; all mining operations have ceased on these properties.

These deposits are near "the contact between the body of plutonic rocks referred to as the Iron Mask Batholith and Triassic volcanic rocks of the Nicola group". There are numerous copper showings around the edge of this batholith which measures about 12 miles long by 3 miles wide. Because the copper is associated with magnetite any deposit could be outlined easily by a magnetometer survey. From previous mining operations it was found that deposits were only a few hundred feet long and few tens of feet wide. To the best of my knowledge these deposits were never tested at any real depth.

The Iron Mask ore body, now owned by the Kamloops Copper Syndicate, was worked to a depth of 760 feet. At this point the ore body was cut off by an olivine dyke; it is reported that a diamond drill hole through this dyke located the ore body below. This was in the late 1920's and mining operations were discontinued without any further work being done.

The Kamloops Copper Syndicate has sunk a new shaft to a depth of ninety feet. Mr. Victor Dolmage, Consulting Geologist, has written a short report concerning this and it will be attached to this report.

The Galaxie and Makao mines are separate mines but are controlled by the same people. The Galaxie has the looks of a good property and it has no outstanding debt. The Makao Mine is reported to have 300,000 tons of mineable ore outlined but the property has an outstanding debt of more than \$400,000.

There are a large number of crown granted claims in the area controlled by a Mr. Sartorio, who is now practising law in Italy. All of these claims are reported to show copper on the surface, some have tunnels and shafts, and some have been worked. No constructive work has been done on these claims for a good many years.

If any of the three mines or Mr. Sartorio's crown grants could be reasonably acquired, plus all the ground that is now open in the area, then a good basis for further exploration would be had.

Other mining companies in the area have been plagued by opportunists who go on mad staking rushes at the least sign of a big mining company coming into the area. For this reason a staking program is a necessary prelude to any active work in the area. Such a program could be easily accomplished at any time.

RECOMMENDATIONS:

It is recommended:

(1) that an investigation of all other properties in the area be made to determine the scope that an exploration program might involve. This will be done later this month unless other instructions are received. And

(2) that the above mentioned companies then be approached to see if any reasonable agreement can be reached.

PROPERTIES to INVESTIGATE in the FUTURE.

SLOCAN SILVER-LEAD PROPERTY.

This property is located in the Cody area of the Slocan Mining Division, Kootenay District, B.C. A report on this property was done by S.J. Pedley, P. Eng., for Silver Mountain Mines Ltd. when the latter held an option on this and an adjoining property. Mr. Pedley conducted his investigations over a ten-month period and therefore the report might be expected to be complete and accurate.

This property, the claims of the old Reco Mining and Milling Company, will be visited during the coming week.

TIN PROPERTY in KOOTENAY DISTRICT.

The owners of this property will make a trip to it during the coming week and the property will be examined in the near future. The exact location of the tin was not learned.

ADAMS LAKE COPPER.

An old-timer on Agate Bay, Adams Lake, is reported to have an

September 12, 1960.

interesting copper property; it will be visited as soon as possible.

TELSA LAKE COPPER PROPERTY.

This property is owned by Cecil Kay of Fort St. James, B.C. The samples looked good and high assays were reported over widths to forty feet. Further consideration will depend on the results of correspondence.

DEASE LAKE ASBESTOS PROPERTY.

This property is owned by Mr. Earl Faulkner and he is reported to be, at present, driving a tunnel there. Samples showed good fibre to a length of $1\frac{1}{2}$ inches. Future consideration will depend on the result of correspondence.

"WILFRED M. PARKER"

Exploration Geologist.

September 29, 1960.

REPORT on the LONE STAR and MITCHELL GROUPS

DAWSON, Y.T.

The Lone Star is situated near the head of Victoria gulch, on the divide separating Eldorado and Bonanza Creeks. The property can be reached from Dawson by the road that follows Bonanza Creek to the foot of Victoria Gulch, a distance of 23 miles.

The Mitchell group of claims is situated on the crest of the divide separating Hunker and Goldbottom Creeks. The property can be reached from Dawson by way of the Hunker Creek road to the top of the divide, a distance of 31 miles.

The Lone Star and Mitchell Groups lie within a large belt of schistose rocks known as the Klondike series, which extends across the entire central portion of the Klondike district. The principal rocks are light colored schists consisting of chlorite, sericite, and quartz with minor amounts of feldspar.

Throughout the schist area quartz is abundant. Many large outcrops of white quartz are found. They are of pegmatitic origin and have been shown to be barren of gold. In addition to these, there are countless seams, veinlets and lenses of quartz found within the schist, parallel to the foliation. Pyrite, in small cubes, is found in association with these veins and is probably of secondary origin. These veins have been shown to be practically barren of gold.

A third and younger group of quartz veins exists and nearly all the gold in the Klondike District can probably be attributed to them. They vary in width from a fraction of an inch to more than a foot and intersect the schistosity almost at right angles. They are lenticular and are not crumpled or distorted like the quartz veinlets which parallel the foliation of the schist. Extensive sampling has shown the gold values to be erratic and apparently associated with small clusters of sulphides.

CONCLUSION

A report on the Lone Star and Mitchell Groups was written by Robert F. Playter in August, 1947. This report was found to be complete and accurate. The following quotation from Mr. Playter's report is a competent summation of the results of past exploration work.

"I believe that practically all the gold in the Lone Star area occurs in the small, flat, younger quartz veins. The hope of a mine depends on finding a sufficiently large volume of rock in which those veins are so closely spaced that they will "carry" the intervening barren material and make the whole mass ore. If we assume that those veins average six inches in width and one ounce per ton in value, they would have to be spaced at two and one-half foot intervals throughout the entire volume of rock, to make an average grade of 0.2 oz. per ton or \$7.00. Even if they were

twice the width, or twice the value, they would have to be spaced at five foot intervals to make the average grade of the mass \$7.00 per ton.

"The work done by Yukon Consolidated Gold Corporation was well done and is ample to conclusively establish the fact that throughout the most likely area on the Lone Star group of claims, the spacing of the auriferous veins is not 2½ feet or even 5 feet, but is more than 40 feet, both laterally and vertically. There is no evidence to indicate that further work might disclose an area sufficiently large to support a large scale mining operation, in which the spacing of the veins would be close enough to make the entire mass ore.

"I cannot say that no large veins will be found. However, although prospecting is difficult because of the dense covering of moss, that ridge between Eldorado and Upper Bonanza Creeks has been prospected diligently by many prospectors for a period now approaching 50 years. Only small veins similar to those on the Lone Star have been found. Prospectors have therefore tended to verify the conclusion that could be drawn from merely a study of the geological conditions - that only small, lenticular veins can exist in such incompetent schists as those of the Klondike series. Therefore I cannot believe that expenditure in search of larger veins is warranted."

"WILFRED PARKER"

Exploration Geologist.



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