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DOLMAGE, MASON AND STEWART LTD.
GEOLOGICAL AND MINING ENGINEERS
#314 - 355 BURRARD STREET
VANCOUVER, B.C.
CANADA V6C 2G8

VICTOR DOLMAGE
E.E. MASON
J.W. STEWART

FEASIBILITY STUDY OF OPEN PIT AND UNDERGROUND METHODS OF MINING GOLD BEARING GRAVELS AT WINGDAM, B.C.

by

E. E. Mason, P. Eng.,
Consulting Engineer

Dolmage, Mason & Stewart Ltd.

April 29, 1974

Vancouver, B.C.

21. Give the aggregate direct remuneration, including amounts for services rendered, paid or payable by the issuer and its subsidiaries during the past year to the insiders of the issuer.	See Item 21 on attached schedule
22. Give brief particulars of all options to purchase securities (other than such as are granted or proposed to be granted to shareholders as such on a *pro rata* basis) outstanding or proposed to be given by the issuer and its subsidiaries to any person or company, naming each such person or company and showing separately all such options outstanding or proposed to be given to the insiders of the issuer or its subsidiaries.	None
23. State the prices at which shares of the issuer have been issued for cash during the past year. If any shares have been issued for services, state the nature and value of the services and give the name and address of the person or company who received such shares. State the number of shares issued at each price.	250,000 shares at 25¢ per share
24. Give the dates of and parties to and the general nature of every material contract entered into by the issuer or any subsidiary within the preceding two years which is still in effect and is not disclosed in the foregoing.	None
25. Give particulars of any other material facts relating to the shares proposed to be offered and not disclosed pursuant to the foregoing items.	There are no other material facts not disclosed pursuant to the foregoing items.
26. If assets include investments in the shares or other securities of other companies, give an itemized statement thereof showing cost of book value and present market value.	None

27.

CERTIFICATE OF THE COMPANY

The foregoing constitutes full, true and plain disclosure of all material facts relating to the securities offered by this Statement of Material Facts.

Dated May 26th 1975

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To the best of our knowledge, information and belief, the foregoing constitutes full, true and plain disclosure of all material facts relating to the securities offered by this Statement of Material Facts.

Dated May 26/75

FISHER SECURITIES CORPORATION

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SUMMARY AND CONCLUSIONS

The purpose of this report was to investigate the feasibility of mining the deep channel gravels for their gold content. The study was authorized by Bacon & Crowhurst Ltd., Consulting Engineers of #1720 - 1055 West Hastings Street, Vancouver, B.C.

Two methods have been investigated:

1) Open Pit
2) Drift Mining in Pre-frozen Ground

Loram International Ltd., of Calgary, Alberta, made a preliminary study of the first, of the quantities and costs involved, of excavating the valley and back-filling same. A general figure of six to seven million yards was stated, for a preliminary cost estimated at $3.27/cu.yd. for a production of 46,120 ozs. gold.

Weir-Jones Engineering Consultants Ltd., of Vancouver, B.C., have supplied preliminary costs of drift mining 600 feet length of reasonably tested ground. 5000 cubic yards are estimated with a gross value of 7500 - 10,000 ozs. gold. Preliminary costs are estimated at $ 1,210,000 complete. At current gold prices, return of capital would be indicated in eleven to twelve months.

The question of profit or loss lies with the actual costs incurred against the ounces of gold produced, and the price obtained.

The preliminary cost estimates are stated to be conservative. The range of gold values estimated are believed to be conservative also, based on incomplete development of this particular section. The gold

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being concentrated largely on bedrock, production will remain substantially the same regardless of height of working.

Preliminary drilling required to locate the 12 ft. x 30 ft. shaft at mid-channel, could be used to provide a check on the gold values used above. It has been proposed to use Down-the-Hole drilling at 10 ft. spacing for the freezing process, to be stopped within 15 feet if sampling is required, and to sample with the Triple Tube diamond drilling to provide an undisturbed sample for 15 feet. Cost of drilling each such hole, roughly 175 feet length is estimated at $ 1500, completed in $1\frac{1}{2}$ to 2 days drilling time. These holes cased would remain available to the proposed freezing operation.

Downstream from Section A, through Sections I and CC, the gravels have been reworked and the gold largely redistributed. Values reported are too low to support a freezing operation. Upstream from Section F the valley has widened, much of it occupied by the Sanderson bench deposit. There remains a possibility of deep channel gold concentration against the steep, west wall of the valley. Widening of the valley increases the effectiveness of glacial scour, and in Upper Lightning Creek ended its profitability.

Sections C and D, at the downstream end of the property, however, correlate in the pattern of soil deposition at lower elevations with that of Section A. The values reported are 0.82 and 1.21 ozs/cu.yd. respectively for indurated widths of 45 feet.

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These Sections are 1500 feet apart. The intervening area is eminently worthy of investigation, as is the ground downstream from Section D. It is recommended that three intervening sections be drilled between Sections C and D, each of three or four holes per section, to locate and sample the deep channel; similarly, downstream from Section D. The drill holes will be of roughly similar length to those in Section A.

The following is an estimate of completing such a drilling program, totalling 30 drill holes, an average depth of 175 feet at $ 1500 per drill hole.

Direct Drilling Costs	$ 45,000.00
Mobilization and Demobilization	$ 2,000.00
Access Roads etc.	$ 5,000.00
Clear Dump, Shaft site	$ 1,000.00
Engineering	$ 10,000.00
	$ 63,000.00
Plus 10% Contingencies	$ 6,000.00
	$ 69,000.00

Respectively submitted,
DOLMAGE, MASON & STEWART LTD.

E. E. Mason, P. Eng.,

DOLMAGE, MASON AND STEWART LTD.
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J.W.STEWART

INTRODUCTION

First discoveries of rich bedrock gravels in the Barkerville district of the Cariboo were made in 1861, in Williams Creek (Barkerville) and Lightning Creek (Stanley).

Quoting from G.S.C. Memoir 149, Johnston & Uglow 1926, the Lightning Creek discovery "took out 1700 ounces in three days washing. A great rush followed this discovery, particularly in Van Winkle Creek, where 2000 feet at the lower end yielded from $ 100 to $ 250 a day to the man, during the season. The diggings in Last Chance Creek, another tributary, ... four men took out 40 pounds of gold in one day, and the yield that season, from half a mile of the creek, was at least $250,000". At $ 20 per ounce, the raw gold netted about $ 17 per ounce.

However, the loose and porous nature of the gravels above the pay dirt presented drainage problems, which individually operated claims found difficult to handle. By the fall of 1864 the claims were abandoned.

In 1870, production was resumed by several small companies, adequately financed and equipped, acting at times together to handle the drainage problem. A length of 5 miles along the creek went into production. 1870 production was reported at $ 500,000. In 1875, $513,527 was reported against $ 252,731 for the remainder of the Cariboo district.

The Costello, Gladstone and Eleven of England Companies worked several seasons after 1876 below the town of Stanley, the last striking pay in the deep channel. Mining in all three cases failed to meet operating expenses.

The deep channel was considered worked out in the late 1870's. However, important discoveries were made in the 1890's, and in 1902, on benches a few feet above the deep channel. Drift mining virtually ended with the working out of the 1902 discovery. Subsequent mining, with an occasional exception, was hydraulic.

The rich bedrock gravels are pre-glacial in origin. These gravels have a typical "flat wash" appearance. They tend to occupy the deep channel of the bedrock configuration. These channels are relatively narrow. As Johnston states "nor are they very rich in the wide, deeply-buried lower parts" of the valley.

The bedrock gravels are overlain by glacial deposits of boulder clay, stratified sands and gravels, and glacial silts, (slum). These again are covered by alluvial deposits of present streams.

The rich bedrock gravels were worked for a length of 5 miles upstream from a short distance above Stanley. At Spruce Canyon, the point of upstream discovery, the deep channel is reported at 30 - 50 feet to bedrock, and 20 - 50 feet wide. From Spruce Canyon to Stanley the depths reported are 60 - 100 feet, and widths of 50 - 140 feet. The valley widens at Stanley, and as noted gold values were uneconomic.

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From Stanley to Beaver Pass the valley is flat, and about 1000 feet wide, a distance of $7\frac{1}{2}$ miles. The La Fontaine mine of the Cariboo Consolidated Limited held about 5 miles of this distance including the Eleven of England claim below Stanley. Three cross-sections (G.S.C. Memoir 149) show the valley increasing to 1000 feet and more in width, and from 100 - 200 feet depth to bedrock.

Development of the La Fontaine mine commenced in 1903, with production from 1905 - 1907. Described as "probably the best equipped and most efficiently operated deep-drifting mine that has been opened in the Cariboo" by Johnston, production met little more than operating expenses. Lay (M. of M. Report 1935) described the "pre-glacial channel .....(a.s.)... lying at a depth of 125 feet below the creek". Johnston stated "The gravels in the deep channel below Stanley, judging by those seen on the dump of the La Fontaine mine, appear to be glacial gravels".

From Beaver Pass the valley swings southwest into a comparatively narrow V-shaped valley. The Wingdam location is contained in a steep narrow valley shortly before Lightning Creek enters a canyon some miles in length.

Undoubtedly it is these two physical circumstances that led to the choice of Wingdam to renew the search for deep channel gravels as were found on Upper Lightning Creek.

HISTORY

In 1898, the Lightning Creek Gold Gravels and Drainage Company was formed, and commenced 8000 feet of drainage adit from

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the foot of Wingdam hill. This work was abandoned in 1899 when it reached 1500 feet, in favour of a shaft entry in the immediate vicinity of the valley bottom.

Two attempts were made from the Jones Shaft (site of present Melvin Shaft) at 100 and 140 feet depths in 1900 and 1902 respectively. Both failed as they entered the gravels, being lost in a rush of gravels and liquid slum that rose some distance up the shaft.

In 1904, new management commenced Keystone drilling to locate, and sample the deep channel, continuing through 1905. Satisfactory results were reported. In 1906, the plant was enlarged and No. 1 Shaft sunk through soils into rock. A drift was started at 165 feet depth to penetrate into the gravels, and almost completed.

In 1907, the company came under the control and direction of C.H. Unverzaght as President and General Manager. The drift from No. 1 Shaft was completed into the gravels, and flooded out with gravel, slum and water at the point of break-in. Some Keystone drilling was done, and in 1908 No. 2 Shaft was sunk on a Keystone hole, as a prospect shaft.

Work in the following years was intermittent and very limited, none underground until 1917, 1918 and 1919 when some Keystone drilling was done. In 1920, No. 3 Shaft was started in the gravels and lost in heavy water pressures. No record of work exists from 1921 - 1929, when the property, was put in the hands of receivers.

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In 1930, the Consolidated Gold Alluvials of B. C. Ltd. was incorporated to take over about 26 miles of Lightning Creek, including the holdings of the Lightning Creek Gold Mines and the La Fontaine Properties. During the following three years, plant and camps were rebuilt and extended, and the No. 2 (Sanderson) Shaft reconditioned for mining of the pay-gravels encountered at 120 feet depth. About 3300 feet of drifting was done in the Sanderson mine in 1933.

In the fall of 1933, a 26-inch hole was cased into bedrock 142 feet south of No. 1 Shaft, to facilitate dewatering of the deep channel. The casing was perforated at bedrock level and in slum above, resulting in destruction of the pump, and subsidence in the area.

In 1934, control of management was taken over by British interests, who introduced the Australian deep-lead mining method of dewatering the deep channel, from workings in the rock prior to entering the deep channel. The project was examined by Mr. Melvin, consulting engineer, and D. Campbell Mackenzie was appointed General Manager in July, 1934.

In February, 1937, the deep channel was entered from No. 1 Raise Upstream. The gravels were described as very rich. Unfortunately, they did not continue beyond 10 - 20 feet upstream. Working downstream in water is difficult, and gold recovery in water poor. One rich cleanup is reported using a battery of pumps in a short section.

Sanderson mine production amounted to $464, 300.48 from 99, 932 cubic yards washed for the years 1936 and 1937. With the failure of the rich ground to continue in the deep channel, the project was re-assessed

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by its financial supporters, and funds were cut off. About $900,000 had been subscribed or underwritten. A. M. Richmond left a consulting practice to become General Manager in July, 1937.

The operation was reorganized on surface and underground. It was evident there was no possibility of producing an adequate revenue, however, without re-discovery of the rich deep channel gravels. Permission was received from the Inspector of Mines to enter the rich ground indicated between No. 1 Downstream and No. 1 Upstream Raises, astride the Melvin Shaft. Permission was necessary in view of the numerous occurrences of subsidence over the years in that area, and the risk involved. Several caves occurred to surface as late as 1936.

Late February, 1938, the No. 1 Raise Downstream was drifted through slum into the deep channel gravels. These proved to be as rich as described in the break-in from No.1 Raise Upstream. 136 feet was drifted without incident, except that wash water delivered from the Melvin washing plant to the creek began to appear in the face of the advancing drift within 2 hours, and from a drainage hole connected from the rock heading to No. 1 Shaft. Remedial action taken failed to alter the situation.

At 6:00 P.M. March 22, 1938, the drift failed near the entry in slum, and began to fill the lower rock workings. At 3:00 A.M. subsequently, the ground broke through to the creek and rapidly flooded the workings. During these three months, No. 2 Raise Upstream had been broken into the deep channel, and No. 1 Upstream connected to No. 2 Upstream. The break-in from No. 2 Raise Downstream was also under way.

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Following the shut-down, the Sanderson mine was worked with 60% of previous crews there, for the balance of 1938 and early 1939, when it appeared to be worked out. The operation closed April, 1939.

In 1962-63 the drainage workings in rock and the Melvin Shaft were reopened, drained and cleaned out by the Wingdam & Lightning Creek Mining Company. This company having failed to successfully re-enter the deep channel, Dolmage, Mason & Stewart was retained for that purpose. Our records show our participation existed from November, 1963 to May, 1964, in which time No. 2 and 3 Raises Downstream were broken into the gravels. Results are described elsewhere in this report. The final mine plans filed with the Department of Mines show No. 4 Raise Downstream also broken into gravel, subsequent to our withdrawal. It would appear the workings were finally flooded again from this entry.

CURRENT STATUS

The Wingdam property at this time consists of two placer leases No. 6685 and 6707, extending 5200 feet along the valley of Lightning Creek. Wingdam is located 30 miles from Quesnel, B.C. on the Quesnel-Barkerville black-topped highway.

The leases are held under option by Barry Gregory Wilson, of Twin Lakes, 3795 Princess Avenue, North Vancouver, B.C.

All the Melvin Shaft drainage and deep channel workings and the westerly portion of the Sanderson bench workings, are contained in the property. Nine cross-sections have been drilled and sampled across the

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property.

The purpose of this report is to study the feasibility of extracting the gold bearing gravels en masse with the valley soils by open pit, or a reasonable alternative. The Department of Mines are not favourably inclined towards normal drift mining of the deep channel. Environmental and other Federal and Provincial authorities require to be considered in open pitting, additional to the physical problems involved.

The underground plans and cross-sections were assembled by A.M. Richmond, P. Eng., and J. K. Halley, Chief Engineer of the Consolidated Gold Alluvials from the data available; Minor additions were made by J. McIntyre, P. Eng., on the staff of Dolmage, Mason & Stewart Ltd., of the work done in 1964. The break-in to the deep channel gravels from No. 4 Raise Downstream was added subsequently, as noted elsewhere.

Summarizing the Underground Workings:

1. Melvin Shaft, main entry at 260 feet depth to the drainage tunnels in rock underlying the deep channel. These totalled about 3400 feet. Two Raises upstream from the Shaft station, and four Raises downstream have been driven to deep channel elevations, roughly 50 feet above. All six Raises are now reported to have entered the deep channel gravels. Total length of drifting in the gravels is approximately 1450 feet.

Entries from the Jones Shaft (predecessor of the Melvin) were attempted in 1900 and 1902 at 100 and 140 feet respectively, and lost in a flood of gravels, water and slum. In enlarging the Jones shaft in 1934, slum runs gave trouble in the upper soil section of the shaft, apparently

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triggered by heavy blasting in rock immediately below. Several caves to surface were observed in the vicinity of the Jenssen Hole during 1935.

2. No. 2 (Sanderson) Shaft, entry at 120 feet depth to the Sanderson bench workings. These workings extend roughly 1200 feet upstream from the shaft, 300 - 500 feet wide, and 1100 feet downstream, 500 - 900 feet wide.

Thickness of the Sanderson bench deposit was from 6 - 15 feet. Average gold value washed was from 0.140 - 0.144 ozs/cu. yd.

The Sanderson was a bench deposit, occurring partly on a false bedrock of hardpan, 20 feet above bedrock. The gravels were semi-consolidated and rusty. The gold varied in size, but was coarse enough to facilitate recovery. Much of the gold was tarnished to some degree or another.

3. No. 1 Shaft was sunk in 1906. It was broken into the deep channel at 165 feet depth, in two headings to facilitate drainage. Shortly after drifting commenced these were flooded by a rush of gravels, water and slum. A second attempt was started in 1913 at 6 feet lower elevation, and presumably lost. There is no report for 1914.

A third attempt was started in early 1934, and abandoned before break-in to the gravels commenced. The shaft timbering in the solid section above the rock work began to settle visibly, reaching a 30 degree angle to the horizontal finally.

4. Numbers 3 and 4 Shafts are located on Dwg. 3 and on Section F.

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PRODUCTION

The following figures of production have been assembled from the data made available:

	Years	Cu. Yds.	Ozs.Gold	Ozs. /cyd
Sanderson (July - Dec.)	1934	(2199)	312.3	(0.142)
	1935	(17,593)	2,498.2	(0.142)
	1936	47,781	6,800.1	0.142
	1937	52,151	7,305.8	0.140
	1938	(46,021.5)	6,627.1	(0.144)
(4 months)	1939	(13,407)	1,930.6	(0.144)
Melvin	1937	1,821.8	667.0	0.366
	1938	1,050.0	419.4	0.399
Total Ozs. Gold			26,560.5	

* Figures in ( ) are interpolated from relative data.

The yardages reported are of car deliveries to the washing plant. The gravels have a swell factor of 15 - 20 percent. Sanderson gravels being semi-consolidated, 1 cubic yard washed would be derived from 0.833 cubic yards in place, using the larger factor. Grade per cubic yard in place for 0.143 ozs/cu.yd. washed would amount to 0.1716 ozs/cu. yd.

The rule in the deep channel workings was to retain from 2 - 3 feet of rock in the face of the drift, $7\frac{1}{2}$ feet high. Using the lower swell factor for the gravel and 50 percent for 2 feet thickness of rock, 0.8045 cu. yds. of gravel and rock in place would provide for 1 cubic yard washed. Grade for 0.366 and 0.399 ozs/cu.yd. would amount to 0.4549 and 0.4959 ozs/cu. yd. respectively.

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PAY GRAVELS - DESCRIPTION

The target is the deep channel gold-bearing gravels. The gold occurs on or close to bedrock. Thicknesses of 5, 7 and 9 feet of gold-bearing gravels are reported at three points. These would seem to be localized by irregularities in deep channel bedrock configuration and/or stream flow.

Nine Keystone drill sections exist. Of these, AA, J and BB do not penetrate the deep channel. However, the workings between Nos. 1 Raises Upstream to Downstream pass through AA. Sections J and BB are drilled into the Sanderson bench gravels, east of the deep channel. The remaining sections, commencing 100 feet from the downstream boundary, of the property are located at intervals of 1500 feet, 333 feet, 525 feet, 590 feet and 900 feet respectively. The final section F is located 1300 feet short of the upstream boundary, the remaining space being occupied by the Sanderson bench deposit.

The valley floor has a 1 percent gradient. Intersections to bedrock in the deep channel indicate a similar gradient. Outline of the rock walls at roughly half depth from surface (Dwg. 3) show the rimrock or rock walls narrow sharply, immediately downstream of the Sanderson bench about Section F. From here it widens gently through Section AA, and then narrows as gently to Section A. Then it widens to divide around the rock pinnacle at Section 1, continuing at roughly this width through Section CC to Section C. There exists a 1500 foot interval without investigation to reach Section D. Here the channel has narrowed, and is divided

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by a low rock pinnacle rising approximately 25 feet above the deep channel.

Narrowing and widening of the valley influences the rate of stream flow and the rate and nature of its deposits; so also the differential between the outer and inner perimeters of a curve. Pre-glacial deposits survive better in narrow valleys.

It is a moot point whether the Melvin deep channel deposits are pre-glacial. Character of the gold mined in the rich ground, between the Nos. 1 Raises Downstream and Upstream, was distinct from the Sanderson, a glacial deposit; the former being flat, bright, roughly uniform, and coarser than the Sanderson "rusty" gold.

The narrowing of the rimrock at Section F ended the Sanderson deposit, as such. Widening at Section AA and glacial scour could serve in part to explain the lean values between Nos. 1 and 2 Raises Upstream. Drifting was believed to have followed in the deep channel. The gold found was bedrock gold. However, the Keystone drilling suggests a 50 - 60 feet width of deep channel. The entry from No. 2 Raise Upstream indicates a width of 40 feet.

The rimrock has narrowed at Section A. This is the area of early penetration and failures, and similar failure in 1938. The bedrock here is light coloured, decomposed, very soft, and without visible fracturing. It is probably analagous in composition to the soft, limey, quartzites in the Baker member, as found in the hard-rock mines at Wells, B.C.. At 10 - 20 feet upstream from No. 1 Raise Upstream entry into the deep channel, mining crossed into hard, fissile, dark coloured, argillaceous quartzites, diagonally to the workings. The rich pay ended on this contact.

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From this point, drifting to the No. 1 Raise Upstream entry was in hard dark rocks. Little gold was visible, occurrence was pockety, and included gold found in fracturing two to three feet deep in bedrock.

No. 2 Raise Downstream is found on Section I. It broke into East Fork of the deep channel in two places and reported drifting 52.5 feet for a recovery of 0.19577 ozs / cu.yd. The materials reported deposited tend to be finer than that in the West Fork, suggesting a faster rate of stream flow. Only gold colours are reported, of inconsequent value.

The West Fork is at higher elevation. It reports bedrock gold, with thicker deposition against the rock pinnacle. It also reports a gold bearing horizon about 50 feet above the deep channel, reaching 285 feet westerly from the rock pinnacle to a bench on bedrock. These are obviously reworked gravels. The bedrock is the hard, dark quartzites. The increased flow rate of the stream would seem to be indicated by the absence of slum beds.

The deep channel on Section CC was entered from No. 3 Raise Downstream. Some 179 feet of drifting was done for an average of 0.4434 ozs/cu.yd. The geology indicates reworked soils. The bedrock is hard, dark quartzites. Slum beds are absent.

No. 4 Raise Downstream entered the deep channel 150 feet west of Section C. Drainage holes from the rock section of the entry made heavy flows under pressure, and were held under contol

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to minimize drainage of slums. The total workings were subsequently flooded from this entry. A recovery of 4.556 ozs. gold was reported from 33 cu. yds washed of gravels, undoubtedly diluted with slum.

Section D is 1500 feet distant from Section C. The channel here is divided again by a low pinnacle, with high gold values in the West Fork. Some gold is reported in the East Fork, covered by hard-pen. It would seem that in the dual channels found in Sections C and I, the scour was greatest in the East channels.

Section F, 900 feet north of Section A, is located in the narrowing immediately downstream of the Sanderson. The slum beds that occur about elevation 2900 except in the deeply - re-worked sections, are found here also. The scour of this deep channel undoubtedly occurred before their formation, in the rush of water to be expected in a sudden narrowing of the rimrock.

PAY GRAVELS - Estimates

Conforming to Consolidated Gold Alluvials practice, gold values per cu. yd. are calculated for an average depth of thickness of 7 feet in the deep channel gravels, using the modified Radford formula. In three instances greater gold-bearing thickness has been noted. Gold such as occurred in fractures in the hard, dark quartzites between Nos. 1 and 2 Raises Upstream, may provide some increment, but is incalcuable.

Widths are not defined in the Keystone drilling. Widths assumed are those between two Keystone intersections; and extended relative to the indicated bedrock contour, gold occurrences and values reported, and to such information as obtained in the deep channel drifting.

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Spacing between the Sections is reasonable, with two extreme instances. Cross-sectional areas and valuations of each are projected half the distance to the next, except in the instance of Section A. The pay gravels indicated here are estimated for 600 feet length, and adjoin sections adjusted. Gold values used are those reported in the Keystone drilling, except again in Section A.

From the results obtained in 1937 - 38, the length of deep channel between Nos 1 Raises Downstream and Upstream across Section A is considered reasonably proven rich ground. Throughout the 136 feet of drift mining done from the No. 1 Downstream entry the gold was coarse, flat, roughly uniformly the size of flax seed, and untarnished. It was found only on bedrock.

The gold and values found initially in the No. 1 Upstream entry was similar, and lay similarly on similar bedrock. It failed to continue, however, in passing over a contact with hard, dark rocks. The remainder of the work between Nos 1 and 2 Raises Upstream continued in the hard, dark rocks. The writer's recollection of this 150 feet length of underground exposure in 1938, was that relatively little gold was visible, nor had the gold the characteristics described in the rich ground.

Unfortunately, no record exists of gold recoveries that differentiate production from the rich ground in soft bedrock from that on the hard, dark bedrock. Monthly records of gold recoveries in the interval between the loss of the rich ground entered from No. 1 Raise Upstream and the entry of No. 1 Raise Downstream, a period of eight to nine months, would have provided relative valuations.

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Nixon's Report of 1941 offers the following criteria; quoting Campbell MacKenzie, he reports the first pan washed February 8, 1937 in the No. 1 Raise Upstream entry contained 0.15 ozs. gold, the second 1.47 ozs. gold. On February 17th, a pan of soft bedrock recovered 2.77 ozs. gold. From February 16 to 28th, 26 cu. yds. (place measurement) returned 24.54 ozs. gold.

The writer's experience in the No. 1 Raise Downstream entry differed. It was driven with little difficulty, once through the slum drawn down at the break-in, through to the west rimrock. Gold concentration was constant across the channel, until the rimrock rose in the face, where the crosscut was stopped. Drifting was commenced roughly central to the channel. Two crosscuts were started to find the rim on each side, and not completed. Drifting upstream in the channel amounted to 120 feet. The total working was completed in about five to six weeks.

Richmond's 1938, 1st Quarterly report stated gold values indicated by this work as from 1.0 to 2.3 ozs/cu. yd. His subsequent estimate of reserves, after the flooding of the workings, for the 530 feet length between Nos. 1 Raises Downstream and Upstream "when mining a height of $7\frac{1}{2}$ feet, we can safely expect to obtain gravels which will average 1.5 to 2.0 ozs. gold/cu. yd." The writer recollects a test section of the main drift here, drifted roughly central in the deep channel, returning an average of 3.0 ozs/ cu. yd.

Keystone Hole 5, Section A, reported 184.3 troy grains gold on bedrock, which converts to 4.8269 ozs/ cu. yd. for a thickness of 7 feet. The 26 inch Jenssen hole, drilled for dewatering

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purpose 10 feet distant, reported 31 grains of gold at 150 feet depth, and an aggregate of 89 grains from 165 feet at bedrock to 188 feet at the bottom of hole. The Jenssen hole was drilled with a rotary, without baling facilities of ground cased. Retrieval of heavier mineral particles in a rotary rig is erratic, and their true elevation uncertain. The hole apparently penetrated 23 feet of soft, decomposed bedrock. The upper gold reported is anomalous, though Superintendent Keast (1906) reported $ 2.50 recovery from a 6 inch hole half a mile above # 1 Shaft.

Width of the deep channel assumed for this 600 feet length is 30 feet; as determined by the entry from No. 1 Raise Downstream drifted across it, and the width of triple drifting at No. 1 Raise Upstream entry. For the purpose of Open Pit excavation average value used is 2.0 ozs. gold/ cu. yd.

Table 1 is our estimate of the total quantities of gold bearing gravels in the deep channel, and an upper gold bearing strata indicated on Section 1, calculated as described above. They total 123,824 cu. yds. with an average gold content of 0.37246 ozs/cu.yd.

Table 11 adjusts these figures to relate to the total yardages required to be removed and replaced in Open Pit excavation with average slopes at 40 and 30 degrees (Drawing 2). The relative net value obtainable per cu. yd. handled is indicated for each situation.

OPEN PIT PROPOSAL

An excavation of these dimensions and depth presents a number of problems and additional costs to do with environmental considerations. Agreement is required of Federal Fisheries, and

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TABLE I

SECTION	Length Yards	Channel Width Ft.	Area Yd^2	Volume Yd^3	Grade Ozs Au/Yd^3	Total Ozs. AU
D-West Fork	250	45	35.0	8750	1.2071	10,562
-East Fork	250	45	35.0	8750	0.03274	286
C	305.5	70	54.44	16631	0.81993	13,636
C-C	143	40	31.11	4449	0.4434	1,973
I-West Fork	201.17	60	53.33	10728	0.1461	1,567
-West Fork Upper Strata	93.33	285	574.44	53,612	0.06923	3,712
-East Fork	201.17	40	31.11	6,258	0.19577	1,225
A	200	30	23.33	4,666	2.00	9,332
F	183.33	70	54.44	9,980	0.3835	3,827
TOTAL				123,824	0.37246	46,120

TABLE II

SECTION	Open Pit Area YD^2		Open Pit Volume YD^3			Grade Ozs. Au. /Yd^3	
	40° Slope	30° Slope	40° Slope	30° Slope	OZS. Au.	40° Slope	30° Slope
D- West Fork	5057	6307	1, 264, 250	1, 576, 750	10, 562	0.0083543	0.0066985
- East Fork	(included in above)		(included in above)		286	0.0085805	0.0068799
C	5430	7119	1, 658, 865	2, 174, 855	13, 636	0.00822	0.0062698
CC	5422	7922	775, 346	1, 132, 846	1, 973	0.0025446	0.0017416
I-West Fork	4908	5753	987, 342	1, 157, 331	1, 567	0.001587	0.0013539
-West Fork Upper Strata	(included in above)		(included in above)		3, 712	0.0053466*	0.0045613*
- East Fork	3644	3467	733, 063	697, 456	1, 225	0.001671	0.0017563
A-	6680	8180	1, 336, 000	1, 636, 000	9, 332	0.006985	0.0057041
F	3844	4117	704, 721	754, 770	3, 827	0.0054305	0.0050704
TOTAL			7, 459, 587	9, 130, 008	46, 120	0.0061826	0.0050514

* Grade for Total Gold in West Fork

Provincial environmental and water authorities as to environmental requirements and clarification of water used in washing gravels.

The proposal to open pit the two claims was submitted to Loram International Ltd. Their preliminary study and estimates were made without regard to the problem of stabilizing the slum beds, and without consideration of the costs of processing the gold. A copy of their preliminary report is attached.

The cost of constructing a flume to divert Lightning Creek, at the rate of flow required by the Water Resources Board, of 4,000 cubic feet per second, was found prohibitive.

Alternatively they have considered the possibility of excavating during a seven month period of low water, back filling in the remaining 5 months. The total excavation and backfill would be completed in 4 years. The disadvantage in this approach is the one-way haul loaded in each stage of the work, increasing the costs.

The suggested cost figure is $ 3.27 per bank cubic yard. Excluded also is the probability of benching rock on the West rim, generally required as standard procedure by the Department of Mines in an excavation of this depth.

Costs could be minimized by the diversion of Lightning Creek at a point upstream into another valley. A probably possibility is at Beaver Pass, 5 miles upstream from Wingdam. It would require investigation, however, and agreement of environmental and water authorities, lands and water rights owners, above and below Wingdam.

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The slum beds present a hazard to excavation. In place, undisturbed they have an apparent water content. As ground water flow accelerates through the strata to a lower drainage face, they appear to absorb water until they flow, transmitting hydraulic pressures, displacing gravels between them and the drainage face.

An example of dry slum was observed on the southwesterly fringe of the Sanderson workings. It was the result probably of the areal drainage provided by the Sanderson workings, and deep drainage by the Melvin deep drainage system. This slum had been wet and difficult at time of exposure. Had the exposure been made in a single heading before pre-drainage on the scale described, it would probably have flowed and destroyed the heading.

UNDERGROUND APPROACH - Section A

This 600 feet length of the deep channel has been described. Width is 30 feet. Drift mining at $7\frac{1}{2}$ feet height, to include two to three feet of bedrock, amounts to 5000 cu. yds. in place. Richmond's estimate of "$1\frac{1}{2}$ to 2 ozs. gold per cu. yd" (Nixon 1941) would produce from 7500 to 10,000 ozs. gold.

It is proposed to freeze the ground to assure safe working conditions. The proposal was submitted to Weir-Jones Engineering Consultants, who were responsible for similar work in running silts at Abbotsford in 1973 for the Department of Highways. A copy of their preliminary report is attached.

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In summary, the following is proposed:

1. Sink a shaft through frozen valley soils into bedrock in the channel, a probable depth of 170 - 175 feet. Site of the Shaft considered is under the Melvin dump, which could be moved.
2. From the Shaft, freeze the ground surrounding the deep channel in increments of 50 - 100 feet, that will cover the deep channel with safety. The underground topography does not indicate sharp bending in the course of the tunnel.
3. Drift mine the deep channel in retreat from the boundaries of Section A block, in alternative slices of 50 feet, backfilling each off-set slice as mined out.

This work is estimated to be completed in 220 - 250 days. A preliminary estimate of the cost is as follows: -

Shaft Sinking, 205 feet	$ 205,000
Pay Zone Freezing, 600 feet	565,000
Mining, 600 feet x 30 feet wide	350,000
	$ 1,120,000

Mining costs are based on the use of pneumatic transport of spoil to surface, and pneumatic back-filling of mined out ground. Depth of shaft is estimated at 205 feet, or $ 1000 per foot. Cost of mining and delivering spoil to surface is $ 70/ cu. yd., based on a figure of 5000 cu. yds. for $7\frac{1}{2}$ feet height of drift mining. Height used in the estimate is 8 feet. No provision has been made for Headframe or Shafthouse, or for hoisting personnel. A small washing plant will be required.

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Before proceeding with the above, determination of freezing controls will be necessary, involving certain drilling into the site to determine :

1. Direction and rate of sub-surface water flows.
2. Properties of frozen and unfrozen soils to be treated from samples obtained in drilling.
3. Location of shaft at mid-channel.

Costs of such are estimated at $ 60,000 - $ 70,000.

Engineering costs to supervise the preparatory work of Drilling and Laboratory work; the preparation of freezing plans and estimates; relative contract documents; and to provide experienced engineering personnel, are estimated at $ 15,000 - $ 20,000.

Using the larger figures of these estimates, brings the total figure to $ 1,210,000.

The Department of Mines has signified informally that they find no objection to an operation underground in pre-frozen ground, provided the design is adequate. Formal approval will have to await detailed plans and specifications.

Against this estimate is a recovery of 7500 - 10,000 ozs. gold. At the current price of gold, capital may be returned in the term of this operation.

Some criteria of the gold content can be obtained from the preliminary work, or additional drilling undertaken. The drill holes will be aimed primarily at the location of the Shaft.

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SIMILAR POSSIBILITIES

The drift mining between Nos. 1 and 2 Raises Upstream was discouraging in gold recovered. It passed through Section AA to a point 150 feet upstream. The deep channel in Section F 300 feet further upstream has the appearance of being scoured before formation of the overlying slum bed. Gold values indicated in the deep channel by the Keystone intersections is 0.3835 ozs/cu.yd.

Of interest are the occurrences of slum strata covering the deep channel Sections F, A, C and D. Sections AA, I and CC show reworked valley deposits without definite slum strata, and probable remnants and reworked gold deposition.

Section F, as noted, appears to have been scoured before deposition of this slum bed, which seems to find repetition at about 2900 feet elevation at Sections A and C. Section A has an upper slum strata at 2930 feet elevation, and Section C a lower strata about 2870 feet immediately above the deep channel. A unique feature of the slum bed at Section D, it appears to have been drawn down from 2900 to 2870 feet elevation.

Average gold values converted from the Keystone drilling for a depth or thickness of 7 feet in the deep channel are for:

Section CC	0.2829 ozs/cu.yd.
Section C	0.81993 ozs/cu.yd.
Section D	1.2071 ozs/cu. yd.

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Average recovery reported for 331 cu. yds. mined from the No. 3 Raise Downstream is 0.4434 ozs./cu. yd. The ground between Sections CC and C may have some interest. The ground represented in Section I is of insufficient falue for drift mining in pre-forzen ground as set forth for Section A.

The distance between Sections D and C is roughly 1500 feet. The gold values indicated in the Keystone drilling are the most promising on the property exclusive of Section A, in particular in Section D. This ground can do with further investigation, and possibly downstream from Section D. Deep channels exist on both these sections, evidently not reworked as in Sections CC and I and AA.

The deep channel has not been located upstream from Section F. The hillside rises steeply west of the Sanderson workings.

Respectfully submitted,
DOLMAGE, MASON & STEWART LTD.

E. E. Mason, P. Eng.,
Consulting Engineer

April 29, 1975

DOLMAGE, MASON AND STEWART LTD.

CERTIFICATION

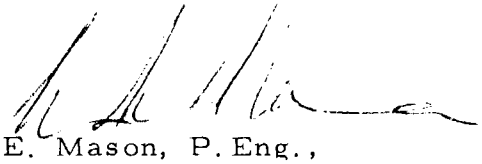
I, E.E. Mason, P.Eng., of Dolmage, Mason & Stewart Ltd., Consulting Geological & Mining Engineers of #314 - 355 Burrard Street, Vancouver, B.C., do hereby certify:

That I am a member of the Association of Professional Engineers of the Province of British Columbia since 1935, and have practiced my professional since 1933 in the province of British Columbia and in the province of Ontario from 1924 - 1932.

I nor any principals of our firm have any direct or indirect interest, nor do we expect to receive any interest direct or indirect in the properties or capital stock of Oriana Developments Ltd. or affiliates.

This report is based on my personal knowledge of the properties, firstly as Resident General Superintendent 1937- 1939, and from November 1963 to May 1964 when we examined and supervised work for Wingdam & Lightening Creek Mining Company.

Yours truly,
DOLMAGE, MASON & STEWART LTD.



E. E. Mason, P. Eng.,

Vancouver, British Columbia
April 29, 1975

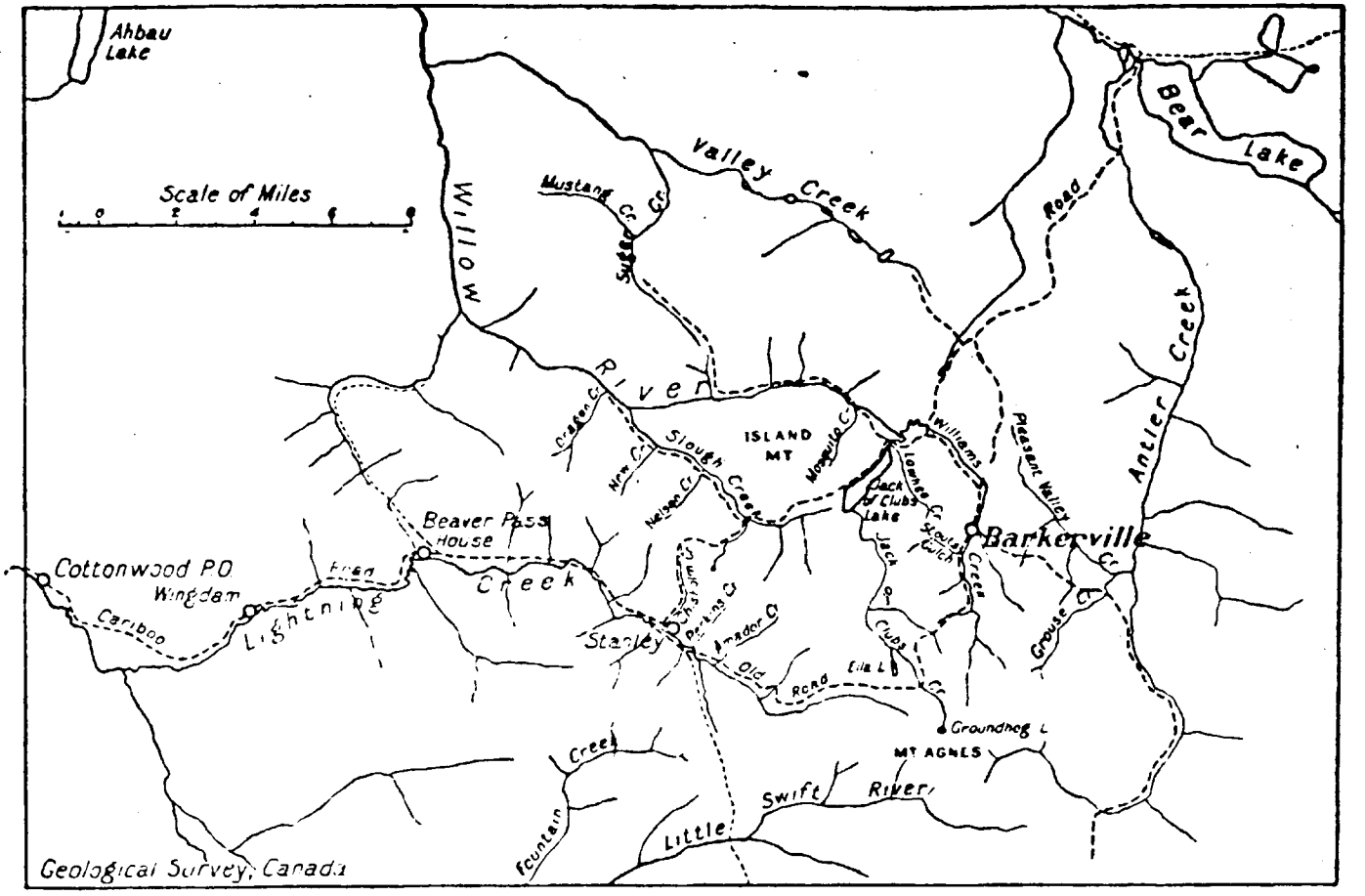


Figure 6. Barkerville district showing location of streams.

FROM G.S.C. MEMOIR 149

DWG. Nº. 1

DOLMAGE, MASON & STEWART LTD.
Mining & Geological Engineers

LORAM
INTERNATIONAL LTD.

"GENERAL CONTRACTORS SINCE 1898"

P.O. BOX 2828, CALGARY, ALBERTA, CANADA T2P 2M7

HEAD OFFICE: 815 - 2nd STREET S.W.
TELEPHONE: (403) 267-5111

April 8th, 1975

Dolmage, Mason and Stewart Ltd.,
Geological and Mining Engineers,
#314 - 355 Burrard Street,
VANCOUVER, British Columbia.
V6C 2G8

Attention: Mr. E. E. Mason, P. Eng.

Dear Sir:

We have reviewed the information on the Wingdam Proposed Open Pit which was included with your letter dated March 26th, 1975 to W. R. Taylor.

The mining of these two placer claims presents some difficult problems and the most critical in our estimation is the diversion of Lightning Creek. The B.C. Water Resource Board had recorded maximum flows up to 1,740 C.F.S. in a three year period from 1938 - 1940 inclusive and recommended that allowances be made for flows as high as 4,000 C.F.S.

We initially felt the cost to do this would be prohibitive and evaluated an approach which would necessitate operating in a 7-month period from mid October to mid April when the water flow in the Creek would be down to 100 C.F.S. or less.

.../2

Mining would be carried out in slices starting from the down stream side of the claims. These slices are to be of a size which would enable us to completely mine out the material in the slice, stockpile the gold bearing gravels, and replace the remainder prior to the spring break-up. A total of four slices would be involved to mine the two claims.

The creek would be diverted through the slice being mined in a four foot diameter pipe which would be bedded into the footwall on the south side of the creek. When mining in the section was completed the creek would be rediverted through the area and the pipe salvaged for the next phase of the operation.

Preliminary cost estimate is as follows:

1.	Relocating and building road (1 mile)	$150,000.00
2.	Acquiring property rights for road	50,000.00
3.	Clearing area to be mined	150,000.00
4.	Stream diversion	90,000.00
5.	Materials handling (2,600,000 b.c.y.)	$8,053,850.00
	Total Cost	$8,493,850.00
	Cost per b.c.y.	$ 3.27

The above costs were developed for one slice using Model 637 Caterpillar scrapers and Model D-9 Tractors. Material was hauled an average of 2,000 feet from a road ramped in on the south side of the creek at a 10% grade. It was assumed that overburden walls would be benched and maintained at 1-1/2 to 1 slopes and that the rock face on the north side of the creek would not require benching.

No allowance was made for processing of the gold bearing gravels or potential problems in the slum zones.

The cost per bank cubic yard includes indirect charges , construction of maintenance facilities, profit, and an allowance of 10% for contingencies.

.../3

This approach is costly due to the fact that all of the material has to be removed from a slice prior to replacing it.

The most desirable way to mine the two claims would be to solve the problem of the diversion of Lightning Creek on a year-round basis. This would enable us to backfill at the same time as mining progressed and would help reduce the unit cost to a significant extent.

We feel that the following steps should be taken to arrive at a viable mining plan:

1. Determine the value of the gold bearing gravel in the two claims in order to evaluate the potential of these claims to support a mining operation.

2. Find a solution to the diversion of Lightning Creek on a year-round basis.

3. Locate a new route for the highway.

4. Determine the capacity and location of the processing equipment.

5. If possible, design a mining sequence which would match the capacity of the processing plant.

Keeping in mind:

(a) The necessity to restrain seepage from the saturated soils upstream. (Because of the type of material involved, we do not feel that grouting would be practical).

(b) The potential problems which might be encountered in handling the slum zones.

(c) The possibility of requiring benching on the north side of the open pit wall rock.

.../4

A detailed study of this project could be carried out on a per diem basis at standard consulting firm rates.

Yours truly,
LORAM INTERNATIONAL LTD.

W. A. Dean
Manager
Mining Division

WAD/dls

WEIR-JONES ENGINEERING CONSULTANTS LTD.

GEOTECHNICAL INVESTIGATIONS AND INSTRUMENTATION SYSTEMS

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BUS. (604) 732-7332
732-7111 224-4821

April 24, 1975

E.E. Mason P.Eng.,
Dolmage Mason & Stewart Ltd.,
355 Burrard Street,
Vancouver, B.C.

Dear Mr. Mason:

Re: Preliminary Feasibility Study for Wingdam

As a result of our previous discussions I have prepared a preliminary cost estimate for the freezing and mining of the high grade region at the Wingdam site.

My estimate is based upon the following assumptions:

1) The high grade region extends for about 600 ft. from Section #1-100 to Section #5+00 on your Figure #1. The average width of the high grade region is 30 ft. and the mean depth is 180 ft. These figures have been supplied by E.E. Mason P.Eng. and are based upon the best information currently available.

2) The site groundwater conditions will permit freezing.

3) Freeze holes drilled from the surface will cost $10/ft to drill and case.

4) Underground freeze holes will cost $15/ft to drill and case.

5) Hoisting and back filling will be done with pneumatic equipment.

6) Average labour cost/man shift will be approximately $100.

On the basis of the assumptions outlined above I am proposing the following mining method

A 12 ft. x 30 ft. shaft would be sunk to a depth of 200 ft. at Section #2+20 directly above the pay zone. The shaft would be sunk by

..... 2

means of a square array of freeze pipes and it should take about 50 days to complete at a total cost of approximately $205,000.

From the bottom of the shaft horizontal freeze holes would be drilled to the east and west so that the pay zone would be surrounded by an inverted U shaped cross section of frozen ground. I have assumed that it will not be possible to drill more than 50 ft. at a time, thus there would be six sections to the west of the shaft bottom and possibly six to the east. The tentative layout is shown in Fig. 1. Should it prove possible to drill horizontal holes which are longer than 50 ft. there will be a significant reduction in costs.

My preliminary estimate for freezing the pay zone on both sides of the shaft between Section #1-100 and #5+00 is $565,000. This is based upon a cyclic freezing procedure in which successive 50 ft. sections are drilled off and frozen. Once a section has been frozen an 8 ft. x 8 ft. drift would be driven to the end of the frozen zone where a drill cross cut would be excavated to permit drilling off the next section. Mining would retreat from this cross cut using off-set pillars, see Fig. 2.

Using this system and alternating the mining and drilling crews a uniform production can be maintained of about 36 yds/day on a 3 shift basis.

The overall mining costs are, of course, extremely difficult to estimate as they are dependent upon the nature of the frozen ground, hoisting system, the requirements of the inspectorate etc. However, based upon what I consider to be a fairly realistic estimate of 3 cubic yds/man/shift, and assuming the use of pneumatic transport and stowing systems the mining costs are estimated at $350,000 and the mining time would be approximately 150 days.

Thus, based upon the assumptions referred to above I have arrived at an estimated project cost of $1,120,000 and a project duration of 220-250 days.

I must emphasize that this is a preliminary estimate and as such it would be subject to revision in the course of the detailed design work. We would not suggest commencing such work until we have examined the site and carried out a detailed geotechnical investigation. The investigation will cover the following points.

1) Determination of direction and rate of groundwater flow in the vicinity of the pay zone

2) Determination of direction and rate of groundwater flow in the vicinity of the proposed shaft

3) Sampling of material in the vicinity of the pay zone to provide specimens for the determination of the frozen and unfrozen properties. This is necessary to obtain an accurate figure for probable mining performance and costs.

..... 3

4) Determination of the actual location and average value of the pay zone. The former information must be available before the final freezing system layout can be established - the latter data will enable you to decide upon the financial feasibility of the project. I would recommend that this investigation drilling be done with HQ or NQ equipment using a triple tube corebarrel with a split tube, in this way essentially undisturbed samples of the pay zone can be obtained.

We are prepared to carry out the following work on your client's behalf

1) Draw up specifications for the site investigation programme

2) Supervize the drilling at the site and carry out all necessary testing and investigation work

3) Carry out all necessary laboratory tests on the physical and mechanical properties of the material to be frozen

4) Draw up detailed project plans

5) Prepare a comprehensive project cost estimate

6) Draw up construction contract documents

7) Advise upon suitability of contractors

8) Provide personnel experienced in freezing work for project supervision

My estimate for the cost of providing professional personnel to carry out items 1-7, exclusive of all out of pocket expenses, drilling costs etc. would be $15 - $25,000 and the work would take approximately 2 months to complete.

The estimated cost of the appropriate site investigation drilling, field tests, out of pocket expenses and all expendable items would be about $60 - $70,000. The sum would cover all the anticipated expenses incurred in the pre-production investigation.

I should like to emphasize that the estimates and feasibility studies that I have prepared indicate quite clearly to me that the pay zone at Wingdam can be totally extracted using freezing techniques. This statement is based on the provision that the groundwater conditions will permit the application of a freezing procedure.

Thus, if your client decides to proceed with the project I feel that the mining can be completed safely and efficiently using a sub-surface freezing system.

..... 4

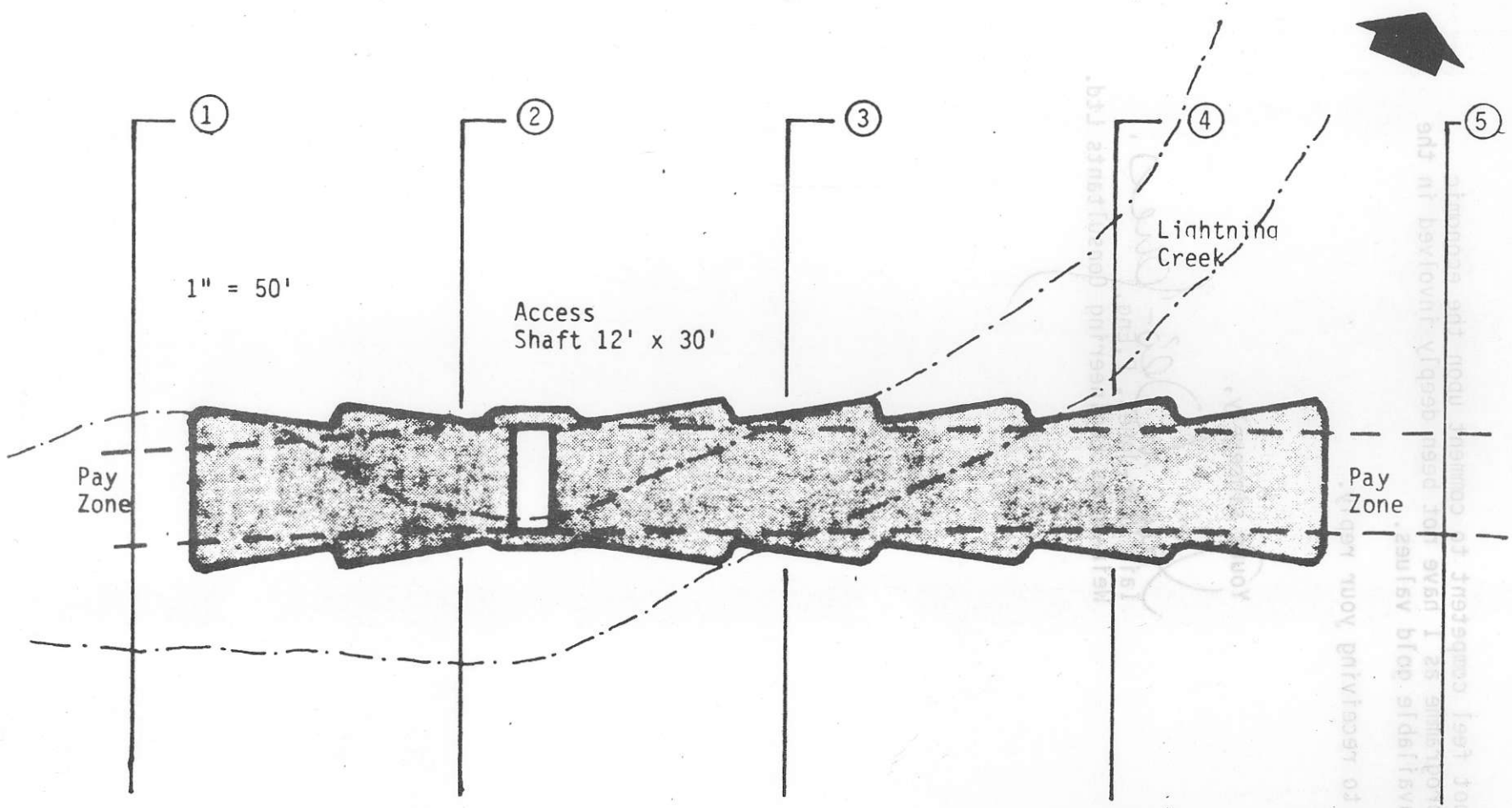
However, I do not feel competent to comment upon the economic feasibility of the programme as I have not been deeply involved in the computation of the available gold values.

I look forward to receiving your reply.

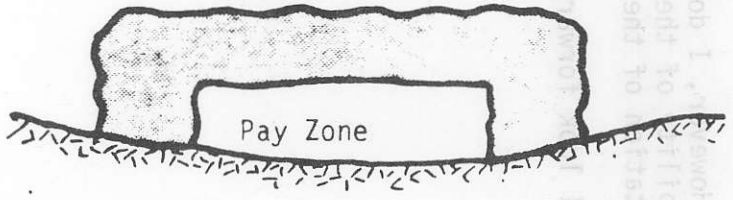
Yours sincerely,

Iain Weir-Jones.

Iain Weir-Jones, P.Eng.
Weir-Jones Engineering Consultants Ltd.



Frozen Zone



1" = 20'

WEIR--JONES ENGINEERING CONSULTANTS LTD.	Tentative Freeze Zone Layout for Wingdam	DRAWN BY:	DATE:	DRAWING NO.
		CHECKED BY:	SCALE:	
		APPROVED BY:	SHEET OF	

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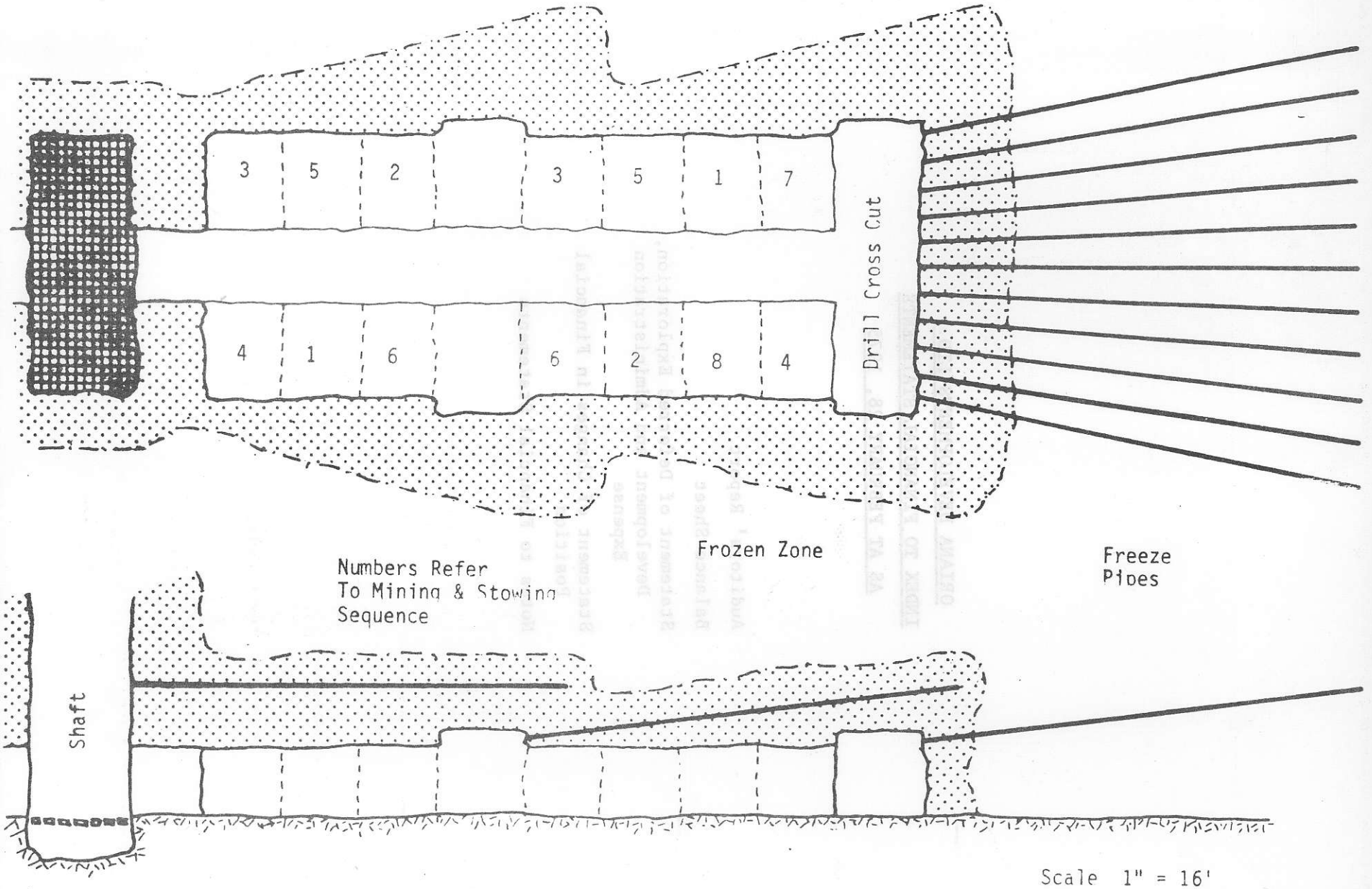

WEIR-JONES ENGINEERING CONSULTANTS LTD.	Schematic Showing Proposed Mining & Freezing Sequence At Mingdam	DRAWN BY:	DATE:	DRAWING NO.
		CHECKED BY:	SCALE:	
		APPROVED BY:	SHEET OF	

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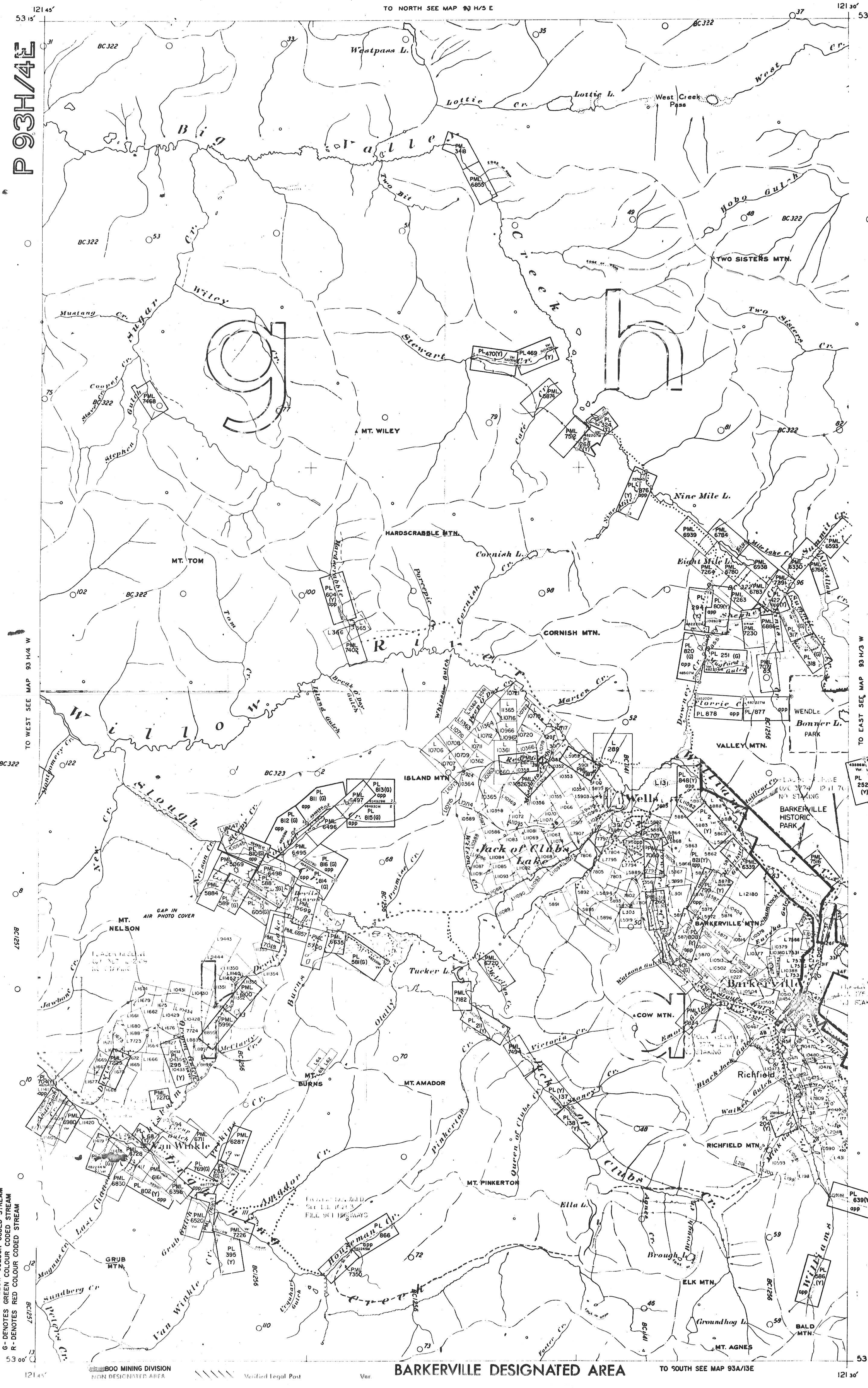
INDEX TO FINANCIAL STATEMENTS

AS AT FEBRUARY 28, 1975



P 93H/4E
TO NORTH SEE MAP 93 H/5 E
TO WEST SEE MAP 93 H/4 W
TO EAST SEE MAP 93 H/3 W
TO SOUTH SEE MAP 93A/13E
121 45'
121 30'
53 15'
53 00'
Westpass L.
Lottie Cr.
Lottie L.
West Creek Pass
Big Valley Creek
Two Bit
Hobo Gulch
TWO SISTERS MTN.
Two Sisters Cr.
Mustang Cr.
Sugar Cr.
Wiley Cr.
Stewart Cr.
Cooper Cr.
Stephen
MT. WILEY
Cafe
Nine Mile L.
HARDSCRABBLE MTN.
Cornish L.
Cornish Cr.
MT. TOM
Porcupine Cr.
CORNISH MTN.
Eight Mile L.
Eight Mile Lake Cr.
Summit Cr.
Tom
Willow River
Break O'Day Gulch
Island Gulch
Whiskey Gulch
Marten Cr.
Downey
Lorrie Cr.
WENDLE
Bonner L.
PARK
VALLEY MTN.
ISLAND MTN.
Slough Cr.
Wells
Jack of Clubs Lake
BARKERVILLE HISTORIC PARK
BARKERVILLE MTN.
Barkerville
Watsons Gulch
Devils Lake
Tucker L.
GAP IN AIR PHOTO COVER
MT. NELSON
COW MTN.
Richfield
Walker Gulch
Black Jack Gulch
RICHFIELD MTN.
Victoria Cr.
MT. BURNS
MT. AMADOR
Amador Cr.
Pinkerton
MT. PINKERTON
Queen of Clubs Cr.
Jack of Clubs Cr.
Van Winkle
Lightning Creek
Last Chance
Grub Gulch
GRUB MTN.
Sundberg Cr.
Houseman Cr.
Ella L.
Brough L.
ELK MTN.
Groundhog L.
MT. AGNES
BALD MTN.
Williams Cr.
Y - DENOTES YELLOW COLOUR CODED STREAM
G - DENOTES GREEN COLOUR CODED STREAM
R - DENOTES RED COLOUR CODED STREAM
CARIBOO MINING DIVISION
NON DESIGNATED AREA
Verified Legal Post
BARKERVILLE DESIGNATED AREA
0 40 80 120 160 Chains
0 1 2 Miles
0 1000 2000 3000 Metres
DATE OF MICROFILM AUG. 18 '77
inches
centimetres