92 I

Aqua. Aurum Mining Co
Fraser River B.C. project

Jan 5 1974

820324

COPY

P. O. BOX 91, COMMERCE COURT WEST
TORONTO, ONTARIO
M5L 1C7

W.J.
D.M.H.
G.M.H.
M.D.R.
I.D.B.
R.D.S.
G.R.
T.W.B.
E.C.J.

March 5, 1974

Dr. W. H. Gauvin
Director of Research
and Development
Noranda Research Center
240 Hymus Boulevard
POINTE CLAIRE 730, P.Q.

Dear Dr. Gauvin:

On February 20, you forwarded data on the Aqua-Aurum Mining Company to Mr. Stovel. As you are probably now aware, Joe has retired, and Mr. W. James, Jr. has replaced him as president of Kerr Addison Mines Limited.

Anyway, we have taken the liberty of evaluating the Aqua-Aurum data, and do not feel that we wish to become involved in the undertaking. Our concern, in spite of the increasing price of gold, is that the idea of reclaiming gold from what amounts to a "live placer" represents an entirely new and, frankly, experimental operation. We feel, too, that the Fraser River could present very severe operating problems.

Many thanks for bringing this very interesting idea to our attention, and we would like you to convey our thanks also to Mr. Peter Morley.

Enclosed please find the data relevant to the Aqua-Aurum project which you supplied.

Yours very truly,

KERR ADDISON MINES LIMITED

G. M. Hogg
Vice-President, Exploration

GMH:js
Enclosure

Feb 22/74

Bill.

This is a very doubtful situation both grade-wise and operation-wise. Indications are that grade is low in such placer sampling that Aquarium was able to do, and it is highly problematical if there is any actual gold re-charging on an annual basis.

As to operation - it is a unique idea, but the collecting towns better have good foundations!

Not recommended.

I will let Bill Irwin know if you wish.

Glen.

Noranda Research Centre
240 Hymus Boulevard
Pointe Claire 730, Quebec
Tel. (514) – 697-6640

noranda

W.J.
D.M.H.
G.M.H.
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E.C.J.

February 20th, 1974.

Mr. J. H. Stovel, President,
Kerr Addison Mines Limited,
P.O. Box 91,
Commerce Court West,
Toronto,
Ont. M5L 1C7.

Dear Joe,

The attached file on Aqua-Aurum Mining Company was referred to me by my good friend, Peter M. Morley.

I must admit that, as a layman, I was intrigued by this proposal, but I am completely out of my depth as far as assessing it is concerned.

If you believe it has any merit, I would suggest you communicate with Mr. Morley directly at (514) 875-2160.

Best regards!

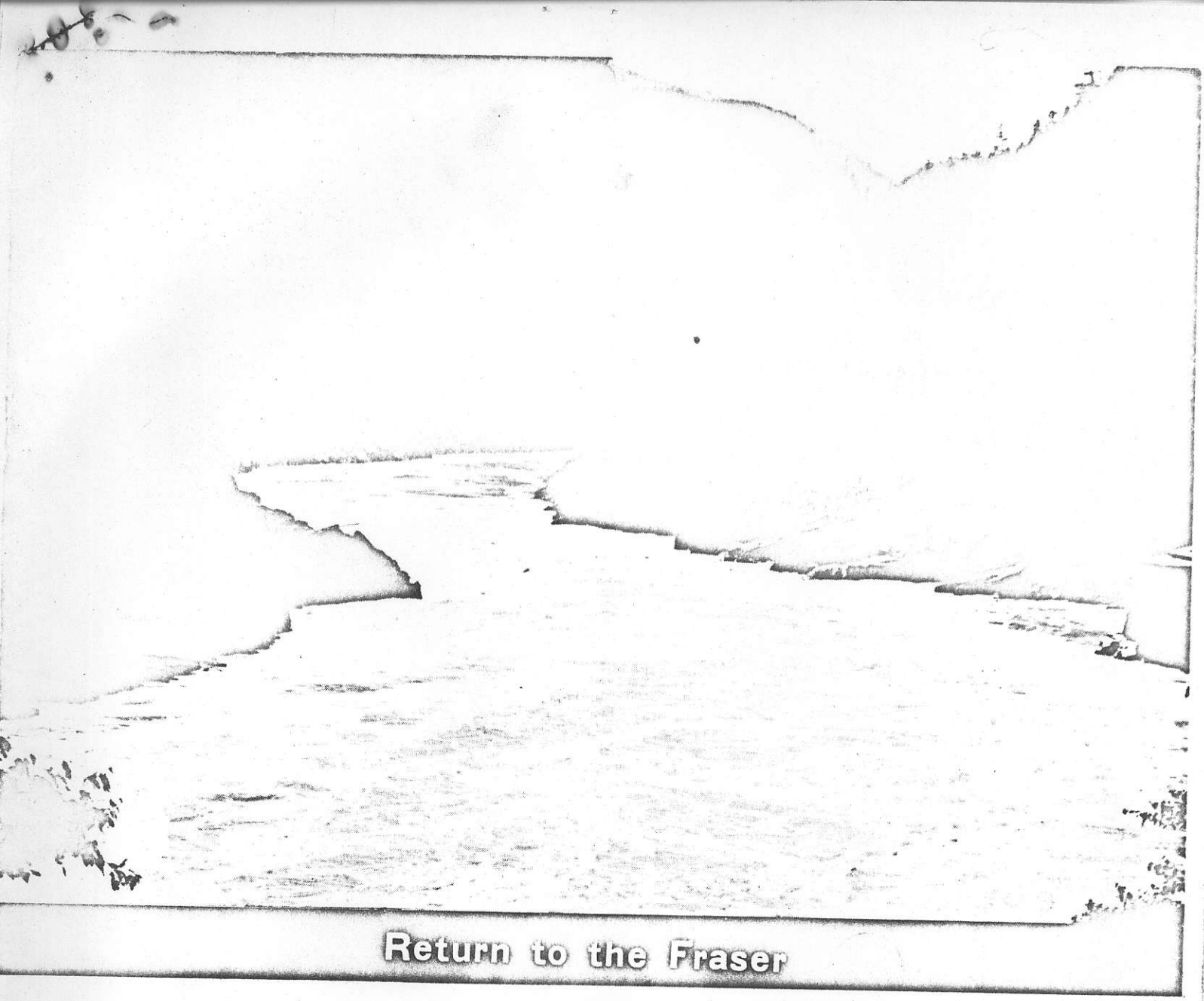
Yours sincerely,

Bill.

W. H. Gauvin
Director of Research and Development

WHG/pw
Encls.

cc. Mr. Peter M. Morley



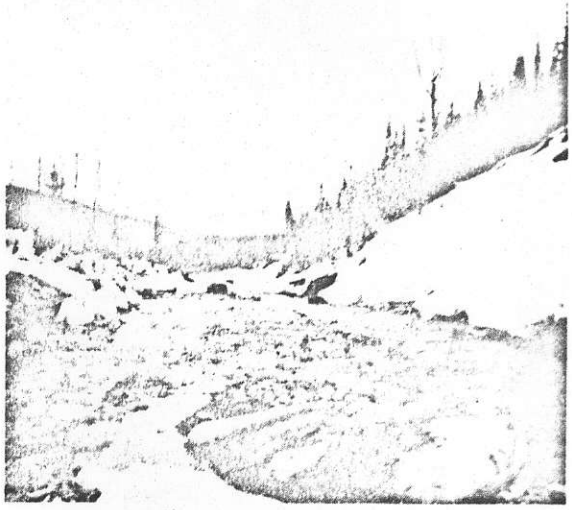
A REPORT ON

AQUA-AURUM MINING COMPANY'S

PIONEER PROJECT

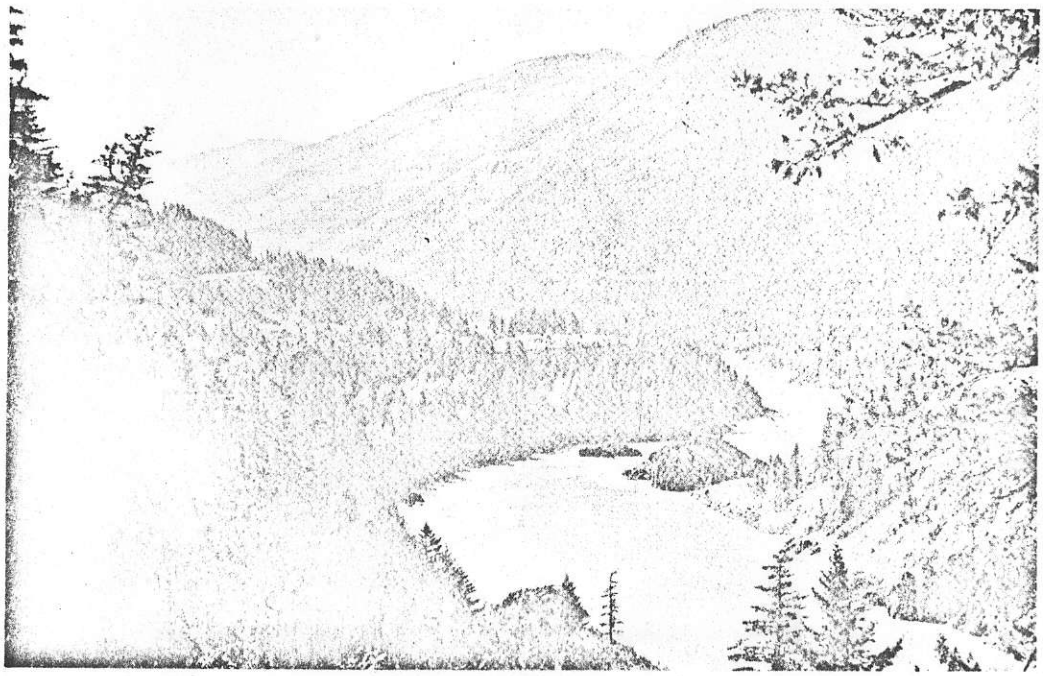
(PHASE TWO)

WILLIAMS CREEK and its tributaries yielded $19,000,000 at $17 per oz. Williams Creek is nine miles long!



WILLIAMS CREEK

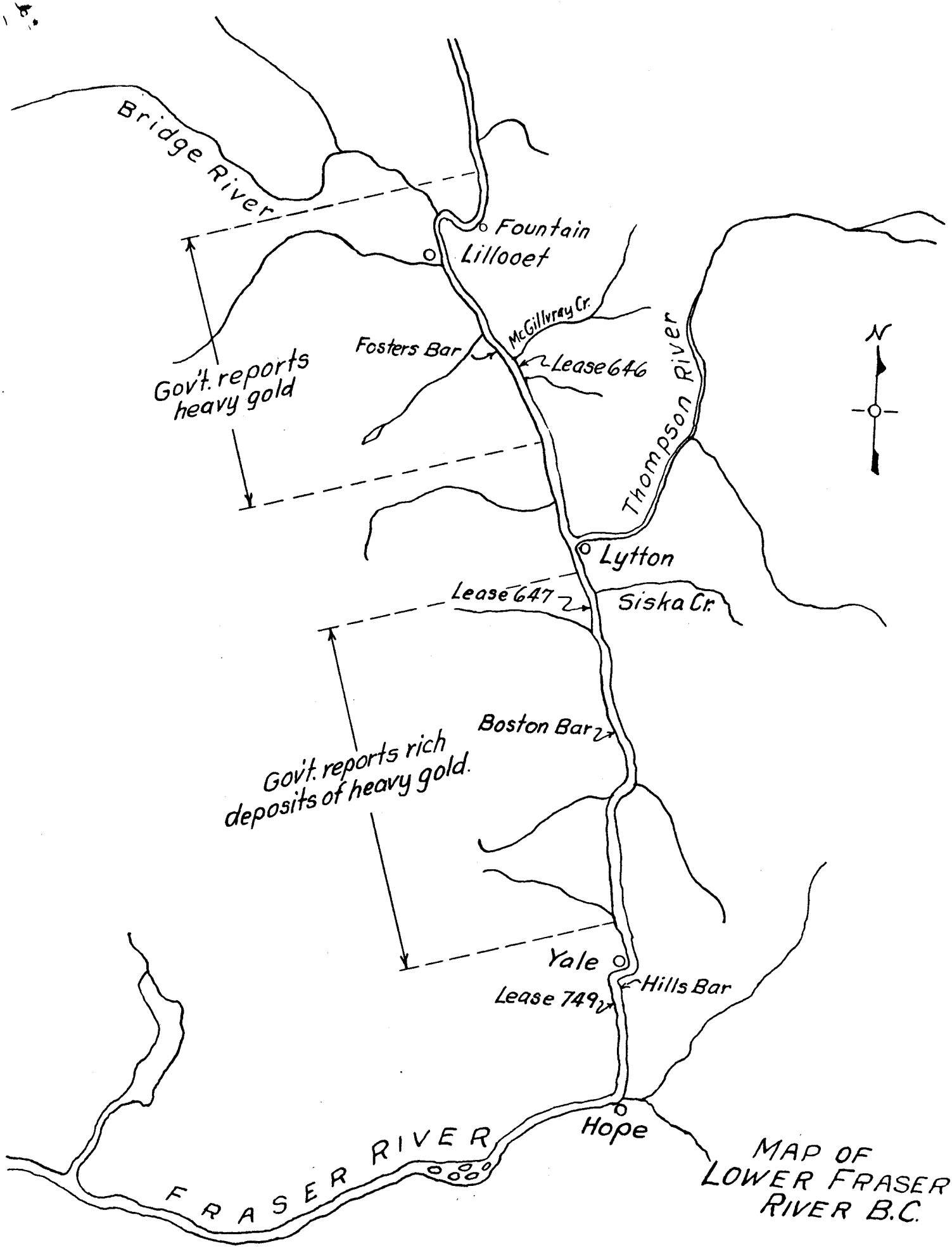
The FRASER RIVER'S "coarse gold" areas extend for over fifty miles – the riverbed, so far, untouched by man.



THE FRASER RIVER

In Hugh MacLennan's view – "The savagest river in the world."

In the minds of many – "The river paved with gold."


Bridge River
Fountain
Lillooet
McGillvray Cr.
Fosters Bar
Lease 646
Gov't. reports heavy gold
Thompson River
N
Lytton
Lease 647
Siska Cr.
Boston Bar
Gov't. reports rich deposits of heavy gold.
Yale
Hills Bar
Lease 749
Hope
FRASER RIVER
FRASER RIVER
MAP OF LOWER FRASER RIVER B.C.

AQUA-AURUM MINING CO. LTD.

(Non-Personal Liability)

OFFICERS and DIRECTORS

George C. Draper
President
& Treasurer

C. Gordon Stewart
Vice-President

Kermack W. McMenamon
Director

Ewing A. Rae
Director

Gordon D. McKay, Q.C.
Secretary

George C. Draper, Jr.
Assist. Secretary
& Director

F.C. Tomlinson, P. Eng.
Consulting Engineer

Canada Permanent Trust Co.
Transfer Agents

Cushing Smith & Co.
Auditors

Gordon D. McKay, Q.C.
Solicitor

Offices
900 West Hastings Street
Vancouver 1, B.C.

and

282 Westgate Crescent
Rosemere, Que.

AQUA-AURUM MINING CO. LTD.

(Non-Personal Liability)

This Company, incorporated under the laws of British Columbia, has been formed to recover gold and other precious metals from the beds of fast-flowing rivers where conventional mining methods are impracticable. The methods proposed are the results of extensive research and development over a period of years. The initial operation relates to the Fraser River in British Columbia — a river which has so far defied all attempts to reach the gold-bearing gravels in its bed.

A brief description of this turbulent river and highlights of its early mining history are outlined, followed by a description of Aqua-Aurum's ingenious methods to recover the gold, platinum and other precious metals from its bed. This is followed by tables showing the latest cost estimates.

THE FRASER RIVER AND ITS MINING HISTORY

The Fraser River has been a source of placer gold for more than 100 years.

The Department of Mines of British Columbia reported a yield of $28,983,106 in the period from 1860 to 1869. This placer gold at today's price would be worth more than 50 million dollars. The bulk of this gold came from the Fraser River bars and the Cariboo District farther north.

About 10,000 miners were working along the river in 1858-9, according to His Honour Frederic W. Howay, Judge of the County Court of New Westminster, in his book "The Early History of the Fraser River Mines." "The bars upon which they were working existed at almost every bend of the Fraser," he wrote. "For ages the Fraser, rushing madly along, had torn away the gold-bearing rock, crushed it in its natural arrastre, and deposited the gold with the accompanying metallic sands in the eddies of those bends. Between Hope and Yale, which was the centre of the mining, there were probably more than 30 mars named and worked; while between Yale and Lytton there were more than 50, and upon them all the miners were at work with rocker and sluice to wrest from its hiding place 'the Yellow Root of Evil'."

MINING OF THE FRASER HAS CONTINUED

Efforts have continued over the years to wrest from the Fraser the wealth of gold the river is believed to possess. The B.C. Minister of Mines reported in 1903 that in nine days $1,500 in gold was taken from an area of 50 feet square on Saw Mill Bar opposite Yale. The bar was under a few inches of water which made shovelling difficult. If the miners were able to go to a depth of one yard, which is unlikely, they would have handled 289 cubic yards of sand and gravel with a yield of $9.00 a cubic yard at today's prices.

SIX OUNCE NUGGETS

The Department of Mines reported:

"From a point on the river a few miles below Boston Bar (about 16 miles above Yale) to Sisco Flat, a short way below Lytton, a distanee in all of about 25 miles, rich deposits of 'heavy' gold were worked. Farther up the river is a second run of 'heavy' gold, which appears to have extended from above halfway between Lytton and Foster's Bar to some little distance above Fountain. Here, nuggets of some size were occasionally unearthed, and there were some exceptionally rich diggings — nuggets up to six ounces in size were reported to have been recovered near Lillooet."

Chartres Brew, Chief Inspector of Police and Assistant Chief Gold Commissioner, wrote as follows to W.A.G. Young, Colonial Secretary, on April 23, 1858: "Out of one claim on Hill's Bar they took in one day 39 ounces of gold and I saw 16 ounces taken out of another claim after a day's work."

ONLY SCRATCHED THE SURFACE

Another Fraser River pioneer, George M. Dawson, D.C., F.G.S., at that time the foremost authority on the mineral resources of British Columbia, wrote in 1889, in his book "The Mineral Wealth of British Columbia" that the early mining operations barely skimmed the surface of the pay streaks.

"A great portion of all this gold from whatever source derived has been gradually concentrated in the river bottom by the action of the stream, while in many places, paying deposits have been left upon the surface of 'benches' at various levels, or buried beneath their material, each such 'pay streak' representing some portion of a former bed of the river which has been left behind as erosion progressed.

"The mode of working these gold deposits was a comparatively simple one. The so called 'bars' were no more than portions of the river bed which, being left bare at low water, could be reached by the miner. They were worked generally to but a very limited depth, often being merely skimmed over in consequence of the trouble from water and the cost of removing any considerable thickness of non-remunerative material to reach the deeper underlying pay streaks. When the exciting discoveries of the Cariboo District became known, the Fraser River was almost abandoned long before its placers had ceased to be remunerative, but since that time more or less desultory work along the Fraser and Thompson rivers has never ceased.

"A great number of the high benches have been superficially worked and have, in some cases, yielded excellent results. In the bed of the river itself at each season of flood, a partial rearrangement of the material occurs and additional supplies of gold are brought in by the wearing away of the banks, a feature having important bearing on the probable successful application of hydraulic mining to some of these deposits. Though no longer exceptionally rich, the bars and benches of the Fraser River seem to afford a practically inexhaustible supply of gold.

"It scarcely, I believe, admits of doubt that extensive and successful mining enterprises based on the application of the hydraulic method of working will yet be instituted along a great part of the length of the Fraser Valley, while dredging or other mehods by which the material of the bottom may be obtained and treated may also be profitably employed.

"Hill's Bar, near Yale, has probably yielded more gold than any other single locality on the Fraser. It was estimated to have produced in all (to 1875) not less than two million dollars worth of gold from an area of less than half a square mile (Report of the Minister of Mines of British Columbia 1875). Its position at the foot of the very rapid portion of the Fraser, where the river first frees itself from the canyon and expands to a greater width with a slacker current, is a suggestive one in respect to the origin of its gold."

The $2,000,000 taken from Hill's Bar would at today's price of $35 per oz. amount to $3,500,000, and to this should be added the value of platinum which was not even recognized by the early miners. Moreover, by the old methods of recovery, the very fine gold was lost. It seems, therefore, not unreasonable to suggest that the yield from Hill's Bar would be closer to $4,000,000.

HIGHEST VALUES BELOW LOW WATER

Another Dawson, this time Dr. J.D. Dawson, California mining engineer, examined two claims in 1934, one at Foster's Bar and another at Willow Bank. Reporting on his investigations, he wrote: "It is my contention that the highest values are still to be found below the low water, and in the river channel proper."

Experienced mining men concede the richness of deposits in the bed of the Fraser River, and many attempts have been made at recovery. With one exception, all previous attempts employed conventional mining methods. The exception occured at Yale in 1929. A dredge pump with hose and nozzle was mounted on a barge and a miner in full diving gear tried to feed the nozzle among the boulders on the river bed. Failure was due to the boulders and the swift current against which the diver was unable to stand. After a very short life the barge, like all the dredges before it, was carried away and wrecked. However, what little gravel was obtained proved to be very rich.

That Nature hoards its gold is well known and in hard-rock mining it must be blasted from solid rock thousands of feet underground. In placer mining this costly operation has already been performed by Nature herself, but where she left the gold, in this case, poses a challenge to man's ingenuity.

Aqua-Aurum accepts this challenge and, furthermore, proposes to employ the very forces of Nature to achieve this goal.

AQUA-AURUM'S METHODS

We have already referred to Dr. George M. Dawson. He is reported to have remarked to a contempory — "If you could put a trap in the bed of the Fraser River and empty it once a year you would never have to work again."

Inspired by Dawnson's remark, a scheme was developed involving a tunnel out under the river in bedrock with holes bored up to the river bed to drain off the fine gold-bearing material. The Company holds a patent on this unique method of placer mining. However, lack of information on the countours and condition of bedrock under the river, and uncertainty as to the values in the river bed material suggested the desirability of devising some means of sampling before proceeding with this tunneling project.

When a method of sampling had been developed, it became apparent that, in addition to sampling, the major segments of a new technique of placer mining with low cost characteristics had been discovered. Consequently, patents were applied for and have now been granted.

NEW PROJECT

A new technique, similar in many respects to its predecessor, was in process of development by our engineers as early as May 1968. When our original project had to be abandoned because of unforseen difficulties encountered by the drilling company, a detailed study of this new method was undertaken.

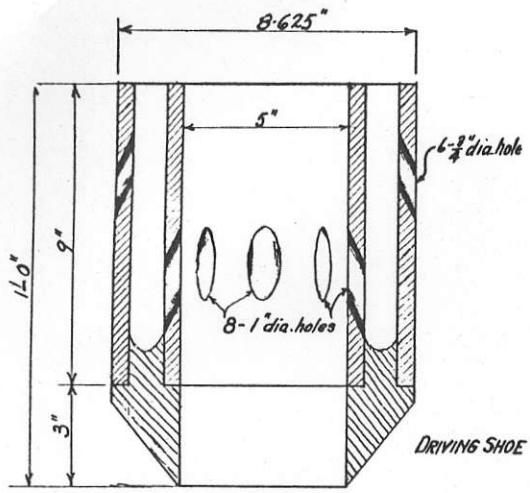
Employing only well established engineering practices, uncertainties would seem to be reduced to a minimum.

This new process involves driving pipes vertically into the river bed material, a simple process using standard pile driving techniques. An apparatus consisting of an 8" pipe enclosing a 5" pipe, joined at the lower end by a driving shoe and at the upper end by a device known as a "follower", will be lowered from the end of a crane until the shoe rests on the river bed.

Both the shoe and the follower are specially designed. The latter is adapted to allow a continuous flow of fluid under pressure to enter the annulus between the pipes, while at the same time to allow a continuous flow of fluid and paydirt to be pumped up the inner pipe. An application for a patent is pending on both the method and the apparatus.

In order to give a positive upward thrust to the material in the inner pipe the driving shoe has a series of jets in its inner wall leading from the annulus in an upward direction and a series of similar but downward inclined jets in its outer wall. These latter allow high pressure fluid to impinge onto the paydirt as a flushing agent.

The follower is equipped with a heavy cap to take the impact of a small pile driving hammer. As the follower nears the water level in its downward course an additional length of 8" pipe will be added, its purpose being to take the impact of the hammer and at the same time add weight to the apparatus. The driving operation can then be continued. The depth to which the pipes will be driven will be governed by the values obtained.



One of three types of driving shoe to be used. The multiple jet concept for flushing and lift is a feature covered in a pending patent application.

The advantages inherent in this new method are: first, the recovery operation starts at the very beginning; second, should a large boulder be encountered, instead of drilling through it, the apparatus can be raised a short distance, swung to one side and the drilling resumed; third, the addition of the jets adds a positive thrust to aid the suction of the dredge pump.

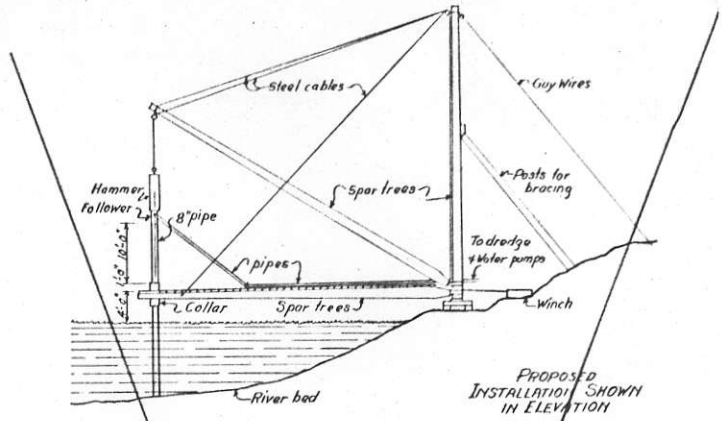
As each site becomes depleted the apparatus will be moved to a new location and the process repeated. When all favourable sites have been covered, the apparatus will be returned to the proximity of the first site and the cycle repeated.

The location found for this operation has much to recommend it. Situated near Yale, easy of access from the highway, the bar is composed almost entirely of sand and lies one mile downstream from the famous Hill's Bar.

The right to carry out placer mining operations on this claim for a period of three months has been granted to Aqua-Aurum by Payco Mines Ltd. on the understanding that Payco is to receive one half of any gold recovered.

Assuming success in these trials, future plans envisage the use of tower cranes with a reach of 150 or even 200 feet and capable of covering a large sweep of river bed from one location. Dredge pumps capable of handling up to 3,000 cu. yds. of gravel per day will be used.

Various aspects of this new system are illustrated in Figs. 1 to 4 inclusive.



This shows a cross-section of the bank of the river with a mast standing vertically on a mobile base. Three spars, rotatably mounted at the base of the mast, extend out over the river, one diagonally and two horizontally. The latter carry a walkway and two pipes, one leading from the follower to a dredge pump and the other from the follower to a high pressure pump and air compressor. Suspended from the diagonal spar is a small hammer, below which the apparatus stands on the river bed.

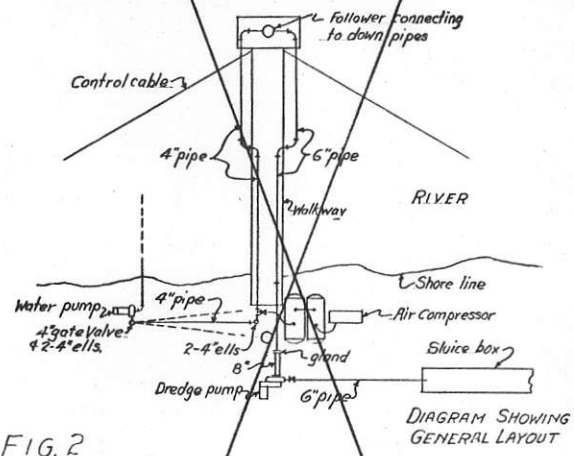


FIG. 2

This shows diagramatically the disposition of the various pieces of equipment in plan view with the diagonal spar removed.

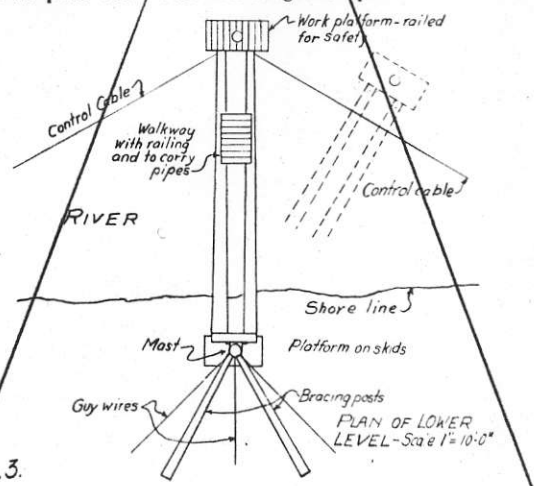


FIG. 3.

Above, also in plan view, are shown the horizontal spars, walkway, working platform and control cables. Also, indicated by broken lines, the horizontal spars and working platform positioned for drilling a new hole.

INDEPENDENT MINING ENGINEER REPORTS ON LOCATION AND PLAN

F.C. Tomlinson, P. Eng., is a member of the Professional Engineers of British Columbia and of the Canadian Institute of Mining and Metallurgy. His work has taken him to the West Indies, South and Central America and Ireland. His experience also covers Ontario, Quebec, the Yukon and British Columbia, including almost every type of mining.

Aqua-Aurum's plans have been submitted to and approved by him, both as to cost and methods to be employed. From his report we quote: "Any method designed to win gold from the bars or bed of the Fraser River below low water mark is worth trying. There must be considerable quantities below low water level on the bars which produced so much gold in the past, above low water mark, e.g. Hill's Bar at Yale."

With the Fraser River virtually abandoned by important mining interests, and with the protection afforded by patents, prospects for sustained expansion would seem to be almost unlimited. As soon as test results indicate success, it is planned to acquire additional claims at other strategic locations — and many such sites exist.

RIVER CONTINUES TO MOVE SAND AND GRAVEL

Dr. E.G. Pretious of the University of British Columbia and Director of the Fraser River Model Project, estimates that the river carries in excess of 18,500,000 cu. yds. of sand and gravel down to its estuary each year. The large percentage of this is silt, but higher upstream in the gold-bearing reaches where the current is fast, sand, gravel and even boulders are carried along. This is particularly so in the season of flood.

The boulders in the river bed, of whatever size, are glass smooth, and when grouped together touch each other at one spot only, leaving interstices through which fine material can gravitate downwards.

In a broad sense, the present proposal is to consider the river as a giant sluice box, installing traps at strategic locations and draining them as Nature refills them.

COST OF PRELIMINARY FIELD TESTS

(Calculations are based on the cost of installing and operating a pilot plant for a period of 30 days plus 6 days for assembling and dismantling)

Pipes, valves and fittings	$2,100
Fabricated parts	704
Equipment rentals including panel truck and car	4,284
Labour, board and lodging	4,480
Spar trees, blocks and sheaves	200
Cables, shackles, etc.	450
Sluice box and lumber	500
Yale Indian Band	200
Transportation of equipment (both ways)	375
Overhead, travelling and supervision	5,135
Contingencies, including gas and oil	1,110
Engineer's fees	500
	$20,038

Note: The monthly operating costs of such a pilot plant are estimated at $9,760. Should it be found advisable to continue this test for an additional 30 days the total cost would amount to $29,798.

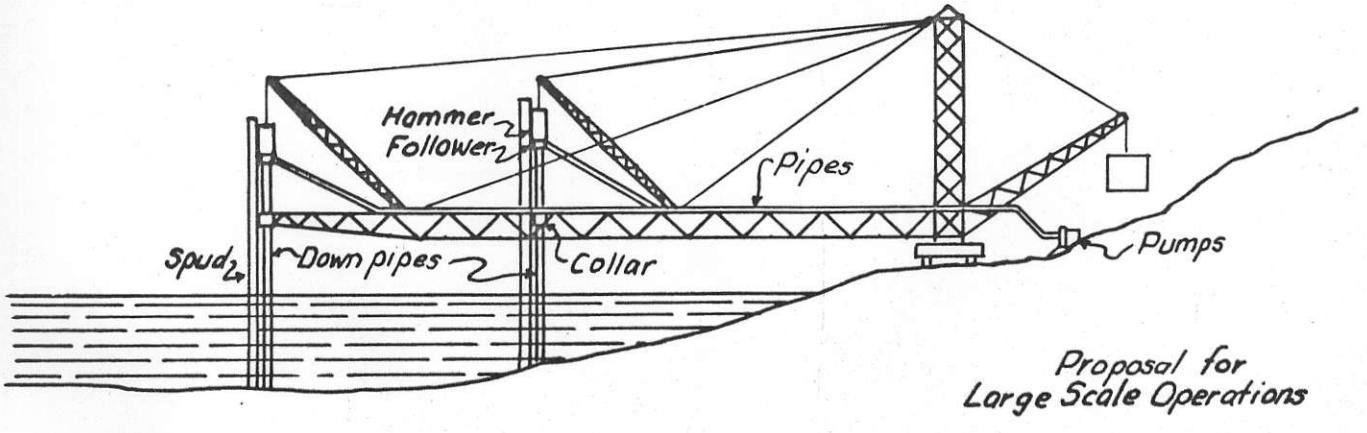


FIG. 4.

Above is shown in cross-section the bank of the river with the type of tower crane envisioned for large scale operations. This will be made in sections to facilitate transportation. Weight can be kept to a minimum as the load factor will be small.

CAPITAL INVESTMENT FOR ONE TOWER CRANE INSTALLATION

Only a rough estimate is possible at this time of the capital investment required for a tower crane unit. It should run to about $90,000.

OPERATING COSTS — 30 days

(tower crane unit)

Overhead	$ 2,000
Labour — 3 men 24 hours per day (2160 man hours) @ $3.50 per hour	7,560
Depreciation on $81,950 @ 30% per annum	2,050
Interest on investment @ 8% per annum	600
Transportation	500
Miscellaneous, including oil and gas	5,000
	$17,710

Breakdown of operating costs

Labour	43%
Interest and depreciation	15%
Overhead	11%
Miscellaneous, including transportation	31%
	100%

Because of the high cost of rental equipment the unit costs of this test are expected to be high. However this is considered of minor importance as the main objectives are: first, to establish the values to be found in the river bed and, second, to prove that the method of recovery is feasible.

The foregoing figures show that capital costs can be increased substantially without affecting the operation costs to any great extent. It follows therefore that the best possible equipment should be used.

The result of this operation will be the creation of depressions (Dawson's Traps) in the river bed. These depressions should collect an almost continuous supply of new material. Tests indicate that the rate of replacement may well keep pace with the capacity of the equipment for some considerable period of time. Details of some of these tests will be found in the appendix.

An unusual feature of this undertaking is the short space of time between the start of operations and the final answer. The directors believe that this period will not exceed eight weeks.

A possibility that could contribute importantly to the success of this project is the development of a commercially feasible method for the recovery of the gold and platinum from the magnetite found in the Fraser River sands.

In this connection, Dr. W.A. Morgan, President of Geo-Met Reactors Ltd., writes in part: "I am pretty certain that we can achieve the recovery of these metals..."

In 1926 G.S. Eldridge & Co., then Provincial Assayers, made an assay of magnetite from the Yale area which showed that 2½ tons of original sand contained $0.80 in gold and $3.75 in platinum, or a total value in gold and platinum of $4.55. Roughly this works out at $2.85 per cu. yd.

In view of the above, and should this Company's recovery method prove successful, the obvious course of an intensive research program will be undertaken.

CONCLUSION

There is reason to believe that Aqua-Aurum's proposed undertaking has considerable promise. All major items of equipment are available at a moment's notice, a team already familiar with what is required in the field has been organized and experience has been gained. What is more, the method to be employd, though unique, is substantially simple, a characteristic that can contribute importantly to success.

Undoubtedly unforseen difficulties will arise, but the major ones have been anticipated and solutions for them, at least in principle, have been found.

Dawson's dream of a trap in the bed of the Fraser River may soon become a reality. There is sound reason to believe that this enterprise could produce substantial amounts of a much needed national and international commodity — GOLD.

APPENDIX

MATERIAL FLOW TESTS

A number of tests have been conducted which have confirmed the validity of our conclusions regarding the flow of materials under various conditions. These tests are applicable to both of the methods described on the previous pages. They were made as follows:

TEST NO. 1 – REFER TO FIG. 5

In this experiment a metal container 23" in diameter and 12" in depth was used. In the centre of the bottom of the vessel was a 3/16" hole which was plugged from above by a long wooden rod.

The container was then filled with sand to a depth of 6" above the orifice. A circle was then described on the surface of the sand of such a diameter (12") that it represented the rim of a cone with apex at the orifice and whose sides would form an angle of 45 degrees to the horizontal.

Two diameters of the circle were then marked on the sand at right angles to one another. At one inch intervals along diameters 20 gold nuggets were placed. These nuggets had come from the Fraser River near Yale. They were flat pieces of gold about 1/8" across.

An additional inch of sand was added to cover the nuggets. The vessel was then filled with water, care being taken not to disturb the sand. The plug was removed and the sand, nuggets and water allowed to escape through the orifice. The nuggets were collected on a screen, the sand and water passing through into another vessel. During the experiment the water level was maintained in such a way that no undue currents were set up.

At the conclusion of the experiment all 20 nuggets were found to have passed through the orifice.

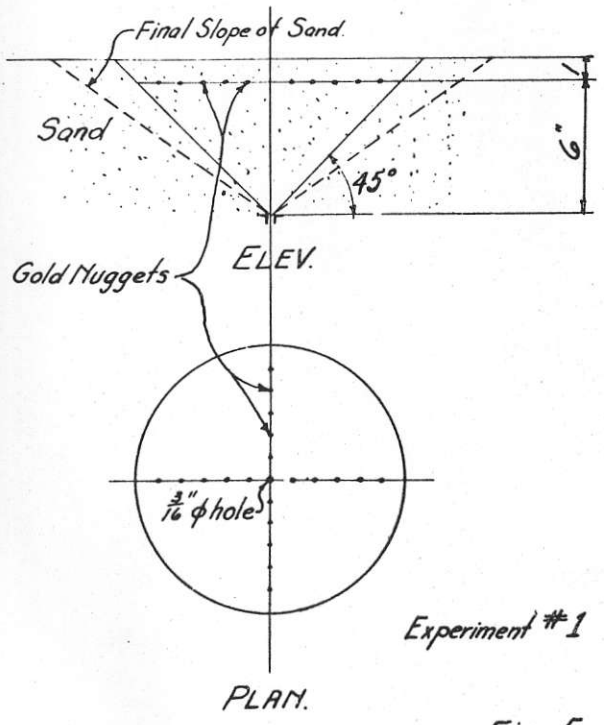


Fig. 5.

TEST NO. 2 – REFER TO FIG. 6

A similar test was carried out using a circle representing the rim of a cone with sides at 30 degrees to the horizontal. This time 40 nuggets were placed along the diameters; all other conditions remaining the same as in Test No. 1.

When no more sand would flow, 25 of the 40 nuggets had passed through the orifice and 6 of the remaining rested within ½" of it. The action of the nuggets, several of which were observed as they travelled down the sides of the cone, was followed closely. They appeared to be carried down by little rivulets of sand and showed little tendency to lag behind the sand itself. The sides of the final cone formed an angle of approximately 35 degrees to the horizontal.

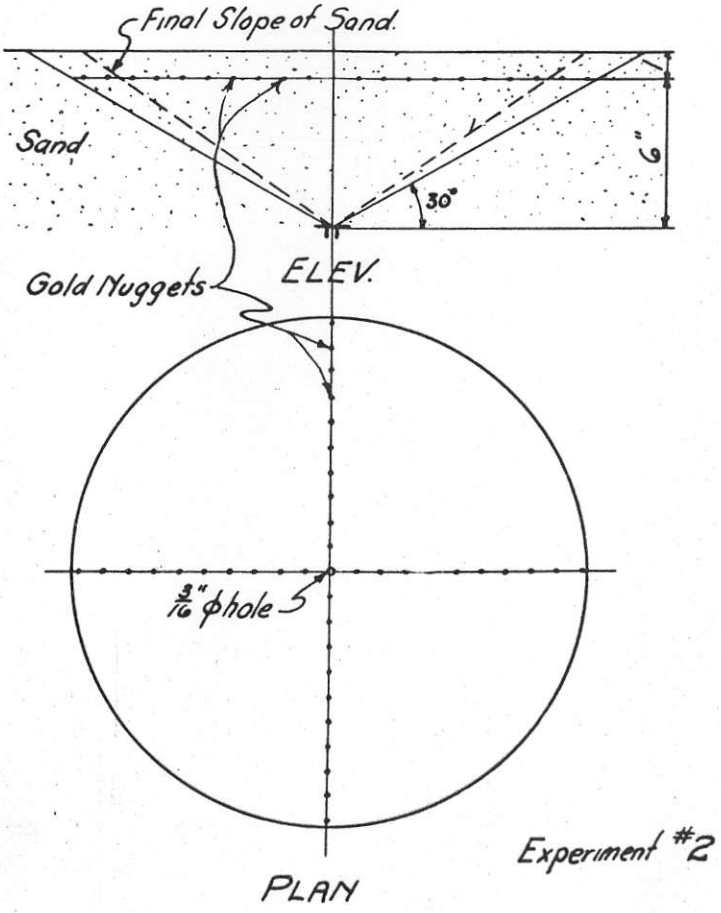


Fig. 6.

TEST NO. 3 – REFER TO FIG. 7

In this test 84 pellets were carefully placed at vertical intervals of 1" as the sand was built up. Fig. 7 shows half the pellets, the other half being in a vertical plane at right angles to that shown. As in all cases, an inch of sand covered the top layer of pellets. All 84 pellets passed through the ½" orifice in a short space of time

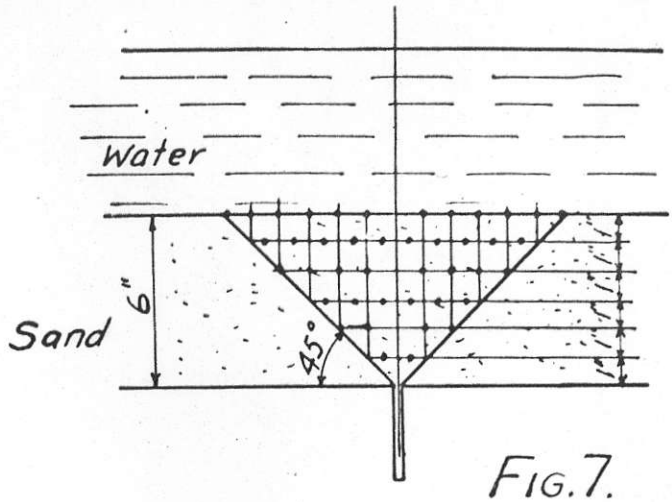


FIG. 7.

TEST NO. 4 – REFER TO FIG. 8

An oval vessel 5 feet long by 3 feet wide was employed. Vertical sides E and F, 8" high formed an oval-shaped channel having a flat bottom. The space in the middle of the vessel was open. A paddle-wheel G, operated by an electric motor, was installed as shown, to induce a current when the vessel was filled with water.

The current developed was estimated roughly to be around ½ mile per hour. Four ½" orifices A, B, C and D were provided and plugged as in previous tests. The floor of the channel was covered with sand to a depth of 3¾" and the vessel filled with water to a depth of 12".

The motor was started and, when the current had reached its maximum velocity, one orifice was unplugged and the sand and water escaping through the orifice collected in a bucket. The water was returned to the vessel. When no more sand but only water passed through, the orifice was again plugged and the same process was repeated at the other orifices in turn. This cycle was repeated until nothing but water flowed through, the time taken being about one hour.

The volume of sand collected was 3,097.5 cu. inches. Four 45 degree cones 3¾" deep have a total volume of 220 cu. inches, so the effect of the current was to refill the cones 13 times. In other words 14 times the total volume of the four cones was collected.

Other tests of various kinds were carried out, the results of which confirm the principles on which the mining methods to be employed by Aqua-Aurum Mining Co. Ltd. are based.

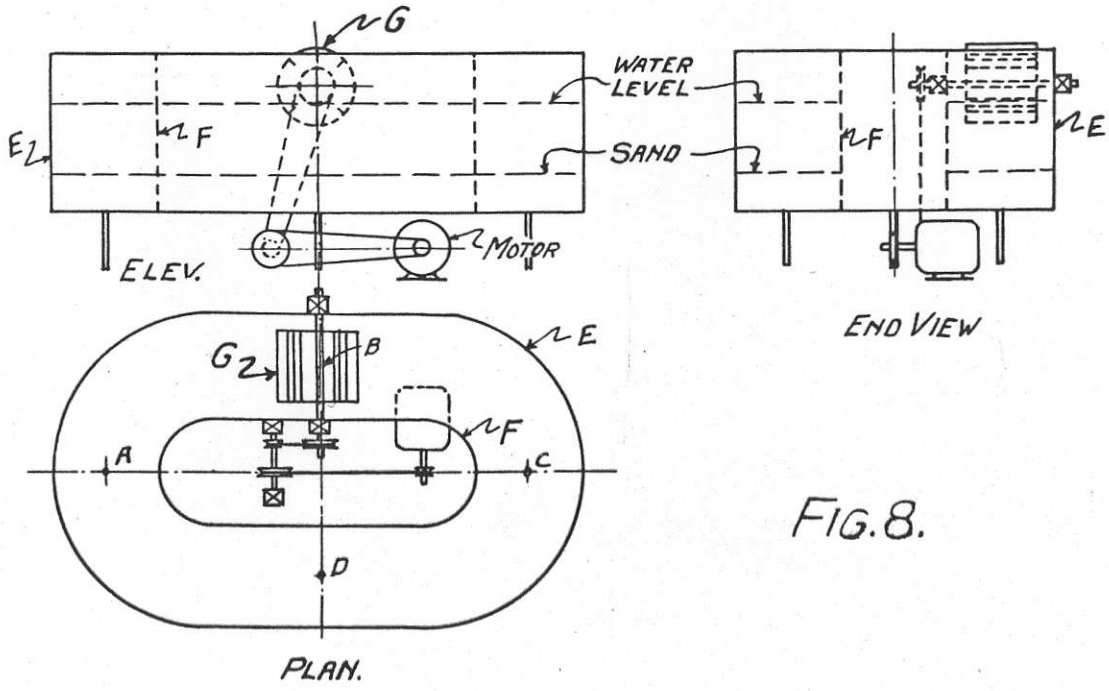


FIG. 8.