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Consolidated
Gold Alluvials of British Columbia
Limited

ANNUAL REPORT
FOR 1935

By D. CAMPBELL MACKENZIE, M. Inst. M.M., M.A.I.M.M.
General Manager and Technical Adviser

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Section 1.

SUMMARY OF OPERATIONS

The following is a brief summary of the various operations carried out on your properties during the twelve months ending 31st December, 1935.

PRE-GLACIAL DEPOSITS.

(a) Melvin Shaft.

At December 31st, 1934, this shaft was sunk and timbered to a depth of 161 feet. By the end of March the shaft had been completed to a total depth of 273 feet, including a large sump with a 10-foot lateral extension. This shaft is a 4-compartment shaft, close timbered throughout and complying with the Mining Regulations in every detail.

The only serious interruption to normal sinking during the first three months of the year was a run of slum, from some undetermined cause, through the old Jones level. This run started on the 14th February, but by the 17th it had stopped and normal sinking was resumed.

Interesting features of the sinking appliances were the safety doors and automatic dumping gear designed and constructed by our own mechanical staff. The sump, with its lateral extension of 10 feet will hold 14,500 gallons of water. During the year the main "downstream" reef drive, seven feet by six feet in the clear, was driven in rock for a distance of 459 feet. The first 25-foot section of this rock drive is 15 feet wide by 9 feet high in the clear. The "upstream" main reef drive has been driven 81 feet. In addition, "off-sets" at intervals of 100 feet have been made to act as stations for drilling up into the main "gutter" which is about 55 feet vertically overhead.

The month of July was an important month in the history of our operations, so much so that I am quoting "in extenso" the conclusion of my report for that month:—

" Important points in July Report are as noted below :

"(1) The installation of the new Johnston pump in the Melvin Shaft.

"(2) The successful bringing of the drainage from the Unverzagt Shaft (No. 1) to the Melvin Shaft, by means of vertical holes (over 50 feet long) drilled from the main reef drive in the Melvin Shaft into the lower drive in the Unverzagt Mine. The first "important "milestone" in the Australian Method has now been safely passed.

"(3) The footage drilled with the Keystone drills, working one shift per 24 hours, "constitutes a record for any month in the history of the Mine. The total footage "drilled was 578 feet.

"(4) Taking the hours worked into account, the work done in the Melvin Shaft was "creditable:—

"Main reef drive extended to 362 feet,

"Two off-sets constructed,

"Two vertical holes drilled into Unverzagt Mine,

"Air receiver installed underground.

"(5) The yardage mined from the Sanderson Mine constitutes a record, totalling "8,514 cars holding 3,211 yards of gravel." "

At this stage, with the hydrostatic pressure of the deep "gutter" water reduced to about 14 pounds per square inch, and a drainage centre established in the Melvin Shaft, it seemed certain that it was only a matter of a few months until a safe entry could be made into the pre-glacial gutter either from the Melvin Shaft, the No. 1 Shaft, or both.

Then, on the 8th August, we had another burst of slum from the vicinity of the Jannsen big drill hole; and on the 10th August the power station was burnt to the ground.

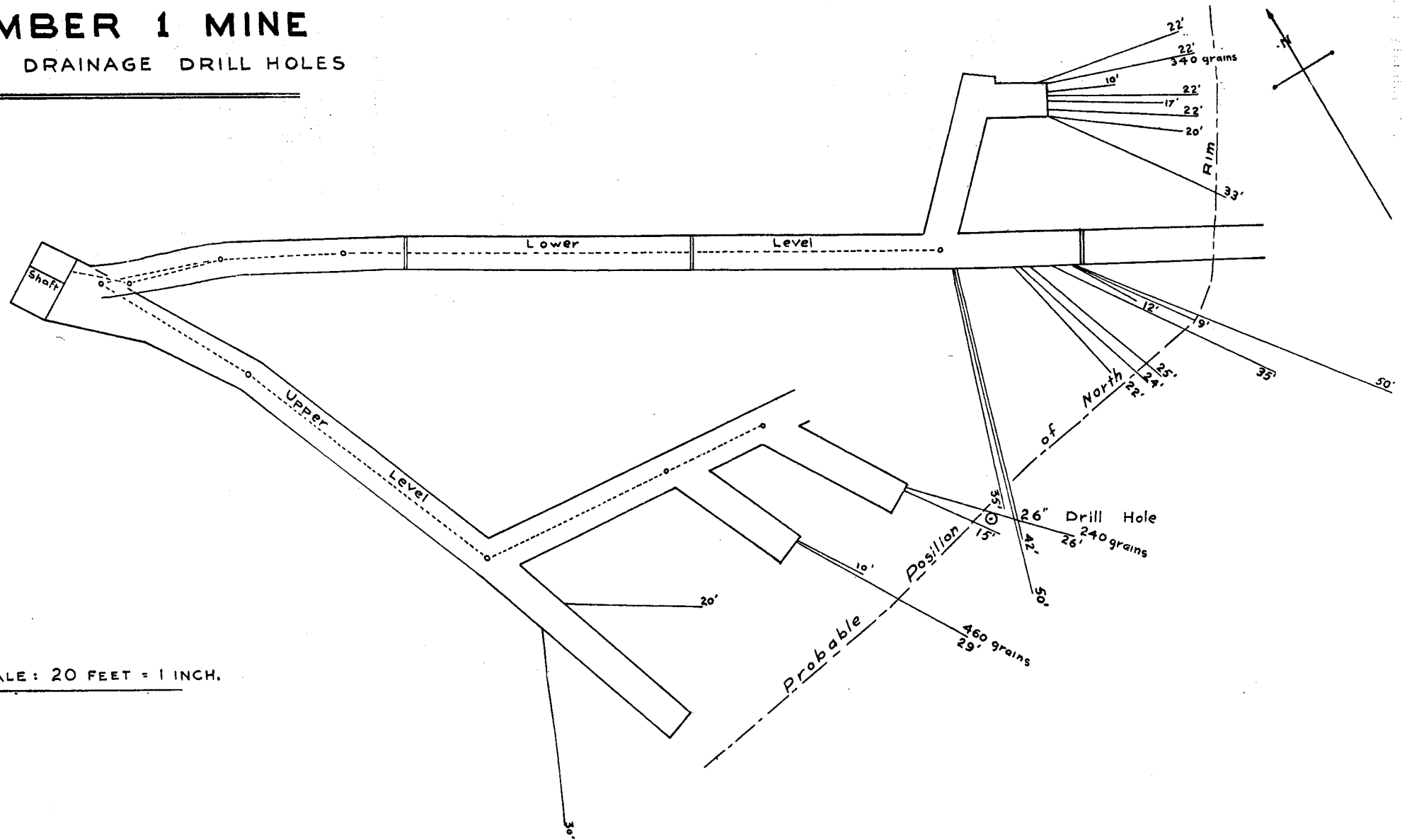
These set backs have been reported on in detail and will further be commented on later in this report.

COST OF MELVIN SHAFT TO DECEMBER, 1935

Prior to January, 1935	\$ 11,420.38
During 1935:—	
Shaft sinking	\$ 10,002.47
Reef drives and shaft bottom.....	13,061.01
New shafthouse (incomplete)	9,351.62
	32,415.10
	\$ 43,835.50

NUMBER 1 MINE

SHOWING DRAINAGE DRILL HOLES



SCALE: 20 FEET = 1 INCH.

(b) No. 1 or Unverzagt Shaft.

In this shaft at December 31st, 1934, the lower level (named New Level in my Annual Report for 1934) was in a distance of 164 feet. Knowing that we were in the vicinity of the deep "gutter", every precaution was taken by drilling "flank" holes, "breast" holes, and "uppers" as the level advanced. We extended the drive to 177 feet, using extra heavy timber and lagging as we entered the more decomposed rim-rock.

A "feeler" hole drilled upwards at the face began to run water but without much pressure. A few hours later (on 6th January, 1935) the timber next the face began to creak, and the miners had just time to close the bulkhead door before a burst of slum from the "downstream" side of the lower level filled the shaft up to about 30 feet from the bottom. After overhauling the Pomona pump we began the dangerous job of clearing out the old drive of the accumulated slum and gravel. Under Foreman Knowles' careful supervision, this work was completed by the end of January, and a strong bulkhead put in close up to the "burst". Over four ounces of inter-glacial gold was recovered from the slum and gravels. It is important to note that no pre-glacial gold was recovered, indicating that the "burst" came in from overhead, i.e., above the main "gutter". After the slum had been cleared out, a rock drive was started "upstream", some 20 feet back from the face of the lower level, and continued for a distance of about 30 feet.

About 20 feet along this drive another rock drive was driven to the right for a few feet at right angles to it. These two faces were to act as drilling stations for the new No. 3 Holman air drill. During February several drill holes were successfully put up into the gravels and the flow of water increased. The old Unverzagt level was cleared out and drilling stations established there. The first hole in this upper level was drilled a few degrees above the horizontal and tapped the "gutter" at 29 feet. From the first 26 pans of gravel that came through the hole we recovered 10 dwts., 18 grains of heavy gold. The drill was moved further "upstream" into No. 2 cross-cut and two holes bored, one into the "gutter", and a shorter one up through the rim-rock. From one-quarter cubic yard taken from the first of these holes over 10 dwts. of heavy gold were recovered.

Altogether during this period nine holes, aggregating 225 feet, were drilled, with the encouraging result that the flow of water increased from 125 to 600 gallons per minute. As noted above, two of these holes were bored directly into the deep "gutter" for testing purposes.

During the month of May, eight additional holes were drilled from the lower level for drainage purposes. One of these holes, drilled horizontally, reached the "gutter" at 26 feet. The gravel which ran from this hole was carefully washed, and the remarkable result of 17 dwts. of heavy "gutter" gold recovered. As this test was made over 85 feet "unstream" from the previous tests, it seems to indicate a certain uniformity of "spread" in the values as against the "rich pocket" theory. It is also a further important confirmation of the rich values disclosed by surface Keystone drilling, particularly of the lines drilled before I took charge. Inter-leaved will be found a sketch, drawn to scale, indicating the location of the various horizontal and inclined drill holes which have "tapped" the channel from the No. 1 Shaft underground workings.

It was very gratifying to note the effect these drainage holes had on the water pressure. Before the end of May it had dropped to about 14 pounds per square inch, equal to about 35 feet of hydraulic head. As noted under the head of "Melvin Shaft" we were able to pass all this water over to the Melvin Shaft by means of drill holes bored from its main reef drive, and so release the pump at No. 1 Shaft.

The "cave" on the 8th August and the destruction of the power house on 10th August put an end to all pumping from this area until the end of the year.

The summary of work done for the year is:—

Drilling drainage holes	704 feet (25 holes)
Drifting on lower level	54 feet

The total costs incurred in this shaft to 31st December, 1935, are as follows:—

From 4th July, 1934, to 1st January, 1935.....	\$2,416.81
During 1935	4,523.16
	<hr/>
	\$6,939.97

INTER-GLACIAL DEPOSITS.

Sanderson Mine (Old No. 2 Shaft)

In December, 1934, we started pumping out these workings using the Layne and Bowler pump. The steam turbine was replaced by a motor using power from the power station at the Main Camp. By January 29th we had the old workings pumped out. An underground examination showed that the workings had suffered no damage after their long submergence. It was obvious that in order to work the mine safely and economically, drastic alterations would have to be made to the head frame and sluicing arrangements. Underground, a system of ventilation had to be installed and an assembly station for cars made.

An electric hoist had to be provided, with two drums to allow of the working of a back balance pending the introduction of a second cage at a later date. Thirty-five mine cars were also purchased. In this connection we found that by the installation of a novel "kick-up" of our own design, we were able to use a simple box car costing about \$50.00 instead of the usual dumping and swivelling car common at all metalliferous mines and costing \$125.00 each.

The above work was rushed along, and by the beginning of April we started gravel mining with one party of men and had our first little clean up on 9th April. Altogether 127.156 ounces of gold were recovered in April.

During the month of May, from five working faces, 165.211 ounces were recovered during 24 working days.

The new sluice boxes were put into commission during this month and the ventilation in the mine much improved.

In the month of June, 498.759 ounces of gold were recovered, which gave a nett profit of about \$4,000.00 from this operation alone.

Test pits put down in the developing drives to the east of this pay streak showed that the gold had gone underfoot.

This fact has a most important bearing on the economic value and life of this operation. Of further interest is the correlation of this deposit with the great values disclosed by drilling on the "J" Line about 800 feet downstream. Two verifying drill holes, put down on the "B B" line, about midway between the "J" line and the Sanderson Mine, show payable gold on the same horizon.

As anticipated, this inter-glacial moraine is developing into a most important section of your Company's activities. It has been picked up in length from the "I" line of drill holes to a point at least 1,000 feet north of the Sanderson Mine, and should average about 400 feet in width over that distance.

After the fire on 10th August, we coupled up a steam pump to the Holman portable compressor, and were able to keep the water within bounds pending the installing of a 137-horsepower emergency Marine type Diesel engine coupled to a second-hand alternator.

We began developing the new "Scott's Dook" area in October, the actual output of gold being:—

October	-	-	-	-	178	ounces
November	-	-	-	-	338	"
December	-	-	-	-	693	"

The total recovery of gold from the Sanderson Mine from April to the end of the year was 2,498.169 ounces.

The interruption to development due to the destruction of the power house was unfortunate, as otherwise we would have been able to put up a very creditable performance in the quicker development of this mine.

Recovery Plant (Sanderson Mine).

Owing to the fact that we are able to maintain a remarkably high average percentage of gold recovery, our recovery plant calls for the following brief description:—

The loaded mine cars come to the landing deck by cage and are run into a self dumping gravity device. Here the contents fall into a gravel chute where they get their first contact with high pressure water sprays. Meantime the empty car is maintained in an upside down position long enough for a powerful jet of water to thoroughly cleanse the car before it is returned to the mine.

The gravel in the chute slowly feeds itself into a mechanical "grizzly" when the "oversize" (plus 1 inch) is again subjected to high pressure water sprays, to remove any auriferous sand, before it falls into the dump car for removal to the rock dump.

The grizzly is capable of dealing with about 500 cubic yards of gravel per 24 hours.

The undersize (minus 1 inch) falls into a fixed pan from which it is carried by water into the sluice box head.

Two parallel sluice boxes are provided each 74 feet long and 21 inches wide. To deal with the fine gold from the present workings, special riffles, and Cariboo undercurrents have been installed. The Cariboo undercurrents have been specially designed to suit our conditions, being "stepped down" to form a succession of shallow water falls which assist in trapping any vagrant black sand. The sluice boxes fall at the unusual grade of one foot in twelve but the grade is easily adjustable to meet varying conditions. Only one sluice box is used at a time to allow for continuity of sluicing when a "clean-up" is taking place.

When a "clean-up" is to take place the "feed" from the grizzly is turned into the vacant sluice box by a simple mechanical device of our own construction.

The riffles are then lifted and the concentrates swept over a ½-inch screen—the "oversize" going into the tail race and the "undersize" falling through the screen into a hopper which projects into the recovery room. At this stage we have about 2,300 pounds of a very rich concentrate of minus ½-inch size in the hopper. The concentrate is fed over a fast moving vibrating screen, the "oversize" (plus ⅛-inch) falling on to a simple water concentrator where all the coarse gold is removed.

The "undersize" (minus ⅛-inch) falls into a "boot" from where it is carried by a small bucket elevator and dropped through a chute into the Lorentsen patented gold saving machine. This Lorentsen machine is probably the most efficient machine yet devised for the separation of black or grey sands from fine gold.

During many months' testing of this machine, under the supervision of the inventor, several small weaknesses have been discovered and strengthened. One of these was the escape of too big a percentage of gold from the bowl of the machine into the machine trap. This has been rectified by the use of a wire cage inserted in the bowl and by the lengthening of the agitator arms.

Intelligently used and fed with the appropriate size of concentrate (which is easily arranged) the machine regularly recovers not less than 99% of the gold. It has become an important unit in our recovery system **on merit alone.**

The amalgam from the machine is retorted and the quicksilver returned for further use. A good point about the machine is that rusty gold which does not amalgamate stays in the machine and can be taken out for acid treatment. The tailings from the machine are fed over several "traps" before being discharged into Lightning Creek.

The total clean-up occupies twelve "man hours".

A diagrammatic sketch of the recovery system is enclosed.

The sluice house and recovery plant are a matter of pride to their operators, the consistently high percentage of recovery not being equalled in any other alluvial mine of which we know.

Capital and other expenditure on the Sanderson Mine for the year is as follows:—

Preliminary dewatering	\$ 768.88
New shaft house	11,895.62
Recovery plant and sluice boxes	1,506.10
Other machinery	6,296.24
Underground development	66,787.83
Prospecting by drilling (hand)	1,801.09
	<u>\$ 89,055.76</u>

HYDRAULIC OPERATIONS.

Since this operation ceased on 16th November, 1934, nothing more has been done. When the spring weather arrives we may seriously consider one of several applications we have had from employees to work this area on a percentage basis.

Cost of this work to November 16th, 1934.....\$4,417.75

BIG BONANZA OPERATION.

This operation was closed during the month of January, 1935, the men being transferred to the Sanderson Mine.

Nine ounces of gold were obtained from the last clean-up.

Some surface drilling will be necessary to locate the main channel before resuming mining in this area.

Costs of this operation are as follows:—

During 1934	\$4,206.81
January, 1935	2,959.78
	<u>\$7,166.59</u>

Altogether a total of 51.25 ounces of gold were obtained during the latter part of 1934 and portion of January, 1935.

PUMPING REPORT.

During 1935 a total of 248,000,000 Imperial gallons of water was pumped from the Melvin, Sanderson, and No. 1 Shafts.

The total water pumped since I took charge in July, 1934, until December 31st, 1935, is as follows:—

Last six months of 1934	126,799,910 Imperial gallons
12 months of 1935	248,000,000 Imperial gallons
TOTAL in Imperial gallons	<u>374,799,910</u>

Including maintenance of pumps but excluding capital cost of pumps, the total cost of this pumping effort is approximately as follows:—

1934 (6 months)	\$ 10,000.00
1935 (12 months)	20,000.00
TOTAL	<u>\$ 30,000.00</u>

The enforced interruption of pumping due to the destruction of the power station has lost us about four months' pumping effort equal to about 40,000,000 gallons of water. Obviously, this amount of water has to be overtaken in order to bring the hydrostatic pressure to what it was before the fire.

BUILDINGS.

During 1935 the following expenditure was incurred for buildings undermentioned:—

Administration Building	\$ 6,355.93
New Power House	16,460.04
Sanderson Shaft House	11,895.62
Melvin Shaft House (incomplete).....	9,351.62
Mess Hall No. 2 Camp	3,692.03

For school purposes the old pool hall was purchased and placed on to a new site at a cost of \$500.00, and improvements amounting to \$622.75.

A new Pool Hall building with rooms for transients was constructed under terms at a cost of \$4,559.46 with 5% handling charges for which the Company has received payments amounting to \$3,000.00, the usual rate of interest being charged for the unpaid portion of the principal.

MACHINERY.

The schedule below shows the valuation of some of the new machinery and equipment purchased for various purposes during the year:—

POWER HOUSE.

2 Crossley Diesel engines and compressor	\$ 15,410.00
1 Marine engine and compressor	5,693.58
2 Alternators and Main Switchboard	11,892.00

MACHINE SHOP.

1 Wolcott shaper	\$ 1,210.00
1 Drill press	285.00
1 4-inch pipe threader	750.00
1 power hacksaw	100.00
1 Acetylene welding outfit	200.00

MELVIN MINE.

1 125-H.P. Johnston pump	\$ 6,000.00
1 No. 13 Holman drifter	390.00
1 Holman portable air hoist	540.00
1,000 feet ventilating pipe	300.00
1 ventilating fan	200.00

SANDERSON MINE.

1 Grizzly	\$ 1,500.00
1 25-H.P. motor and pump	360.00
35 ½-yard mine cars	2,000.00
1 double drum hoist	2,300.00
1 6-inch centrifugal pump	600.00
1 15-H.P. electric hoist	600.00
1 electric locomotive with battery charging equipment.....	3,800.00
1 heating equipment	500.00
1 35-H.P. motor	540.00
1 Cleveland tractor (used)	600.00

DRILLING EQUIPMENT.

1 second hand Keystone No. 3 drill	\$ 1,985.00
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The capital expenditure during 1935 for permanent equipment may be recapitulated under the following heads:—

Mine Machinery	\$ 16,049.80
Power House Machinery	39,504.07
Electric Shop Machinery	494.57
Machine Shop Machinery	3,398.43
Blacksmith Shop Machinery	64.10
Sawmill Machinery	1,061.83
Shaft Houses, Machinery and Equipment	9,240.59
Ventilating	244.14
Drilling Equipment	4,191.41
Other Equipment	13,403.55
TOTAL.....	\$ 87,652.49

TRANSPORTATION.

During August, 1935, we arranged for a contractor to take over our Leyland truck at a figure of \$2,000.00, and agreed with him on a reasonable contract rate for delivering machinery and other material to the mine. The contractor received one-half only of his contract rate until the price of the truck was liquidated, which has now been effected.

This leaves one Chevrolet truck and two teams of horses to carry on local transport around the mine.

GENERAL STORE.

In accordance with your instructions, we have arranged for the disposal of the store to private ownership, this to take place at the end of January, 1936.

POWER STATION.

What was generally conceded to be one of the finest power stations of its size in the whole Province was utterly destroyed by fire on the 10th August, 1935. Every care had been taken to keep the station meticulously clean, and no oil rags were allowed to accumulate, yet for some obscure reason, as yet unfathomed, the whole station was burnt out in less than an hour.

The new station is built of steel trusses, hollow tile walls, and Gyprock roof; and, with a concrete floor, is practically fire-proof.

The new Crossley Diesel engines coupled to Westinghouse alternators, and totalling 500-horse power, are already in commission.

The two 250-horse power Diesels that were burnt in the fire were salvaged and are being reconditioned at a reasonable cost, and will bring the power of the station up to 1,000-horse power.

In addition, we have the Marine type Diesel and alternator of about 110-horse power, that was rushed up to keep the Sanderson Mine from flooding. This latter unit is easily portable and should be useful in prospecting the La Fontaine section of the property.

SAWMILL.

During the year 1935, the mill produced the following lumber:—

Rough	856,539 feet B. M.
Planed	479,940 feet B. M.
	<hr/>
	1,336,479 feet B. M.

This lumber was used in the construction of buildings about the mine, including the erection of small houses for employees. A large portion was used in the shafts and below ground.

CORDWOOD.

2,500 cords of wood were cut and delivered during the year, of which 2,447 cords were burned, leaving 53 cords in stock. The larger part of this was used in the boiler rooms and kitchens, or for heating mine buildings.

EMPLOYEES HOUSING SCHEME.

To meet the demand of the better type of our married employees for houses, without undue capital outlay, a plan has been devised which has worked out satisfactorily to both the Company and the employees.

As the Company has its own saw mill and can produce lumber at a reasonable rate, it was decided to provide building material up to the value of \$250.00 for each house. The employee then, in his spare time, provided the labour necessary for construction, for which labour the Company would allow him an amount equal to the value of the same as appraised by our head carpenter—but not exceeding a maximum of \$150.00. Thus each unit would have a value of not more than \$400.00. As soon as the house is ready for occupancy the employee is charged rent, and the value of his labour is credited as rent. Consequently, as soon as the value of his labour is liquidated the Company has the house at a very reasonable cost.

Eleven houses have been constructed in this manner, representing a gross value of \$4,400.00.

The reports of the Survey and Drilling Departments, prepared by Mr. Leroy S. Cokely, D.L.S., B.C.L.S., the Company's surveyor, are set forth below.

SURVEY DEPARTMENT.

This department has performed, in addition to its other duties, exceedingly important work during the year in perfecting the title of the mining area already held and in materially increasing the holdings of the Company. As a result I am pleased to state that the potential assets of the Company in the valley have been increased at least three-fold.

While it would not be wise to attempt to place a value on the Company's property, yet knowing the very high values in gold disclosed along Lightning Creek, and realizing that we hold about 21 miles of the Creek, the amount must be exceedingly large.

In accordance with the Company's extensive plans for the development of the property, it devolved on the Survey Department to see that all the probable auriferous deposits in the valley were controlled by the Company. To achieve this result it was at once apparent that the first step was to define the present holdings on the ground. After this had been accomplished, the valley could be sized up and additional areas required could be obtained as provided under the Provincial statutes.

To obtain additional areas presented serious problems, for the reason that this operation is the first "deep lead" to be worked in Canada by the methods adopted, and the Provincial Placer Mining Act, under which mining ground must be acquired, was not enacted with such development in mind. For instance, 80 acres is the largest area any company or individual may acquire on any one stream. When it is realized that it requires at least \$350,000.00 to develop one "deep lead" major operation, this unsuitable restriction becomes at once apparent.

Various conferences were held in Victoria with the Mines and Survey Departments, and it must be said that we received their willing co-operation.

The result is that the Company now has title to all the land required. Before this was obtained it was the first duty of the Survey Department to survey the Company's main lease (P.M.L. 1077). In making this survey it was necessary to survey about 25 miles of line in the rough timbered valley.

When this was completed it was necessary to "stake" additional parcels of 80 acres each, and it was this department's duty to delineate these parcels in order that the desired areas be obtained and no troublesome fractions left to be staked by alien interests. The legal staking was a large task as we had to have these various 80-acre plots staked by different individuals, who obtained title to the same and later turned them over to the Company.

Sixty-five additional leases were obtained in this manner, and the Company's holdings were increased from approximately 1,650 acres to their present extent of about 6,400 acres. A map, showing the position and extent of the new leases in relation to the old, is enclosed.

When the present management assumed control the property consisted of Placer Mining Lease No. 1077, which was itself a consolidation of 21 leases of about 50 acres each, and four additional small leases. At present the holdings of the Company consist, in addition to the above, of 65 leases of approximately 80 acres each. It is the intention to consolidate these as rapidly as possible into one compact unit.

As it is more than probable that the longitudinal tunnel in the reef rock will disclose valuable lode deposits, as the country rock is definitely auriferous, it was the care of this department to protect the Company's interests in this regard by obtaining a sufficient number of mineral claims, which was attended to during the year.

In planning for the development of a property of this magnitude, and of such great potential value, it is of the utmost importance that there be available all the information and data, covering the entire area, which it is feasible to obtain, both as to the surface configurations and peculiarities, and the formation from the surface down to the reef rock. It is only by the proper correlation of such data that the plan of operations can be intelligently laid out, whereby the development of the property may be proceeded with in an orderly manner, without undue duplications, and without having any phase of an operation interfere with later developments.

To ascertain the most advantageous method of developing this property is complicated by the fact that a situation exists which is unique in "deep lead" mining. This, in brief, is the fact that in addition to the Tertiary deposit in the deep channel, there exists, over a portion of the property at least, a very valuable secondary alluvial deposit. This latter might be said to be suspended in the gravels, some 60 to 80 feet above the deep channel, and from a 100 to a 120 feet below the surface creek. As the fill of the ancient channel is sand, gravel and clay to the surface, it requires very careful study and planning to allow both sections to be successfully mined without interference, and with safety.

The value of this secondary deposit is amply proved by the Sanderson Mine, which is operating in the same.

The collecting and correlating of the necessary data is being proceeded with from time to time, but the various methods employed are too diversified to be enumerated here. However, it might be said, that deep drilling is the outpost for the collection of sub-surface data, and this branch is directly under the control of the surveyor, who lays out the drilling programme, and checks and tabulates the results.

During the year the preliminary drilling of the Wingdam Section was completed, details of which are given elsewhere in this report. It is the intention to commence drilling the Beaver Pass Section in the spring. This section is exceedingly interesting as here exists an ancient settling basin or lake-bed, of some 600 acres, which may possibly prove to be potential dredging ground.

In order to provide for later developments up the valley from Wingdam, a 320-acre farm was purchased, which, for the time being, has been leased to a rancher who holds the contract for supplying our camps with fresh milk. This area is nearly level, and will afford an excellent townsite—suitable sites being scarce in the valley.

The Company already held 160 acres of free-hold, and during the year application was made to the Government to purchase an additional 240 acres, in order that we might obtain Indefeasible Title to the land on which our improvements are located. The buildings at the Sanderson Mine are on this portion.

Many small jobs were handled by the department which it is not necessary to enumerate. However, mention should be made of the installation of a domestic and fire protection water supply. The water is brought to the main camp from Ramos Creek, a distance of about a mile, and furnishes an abundant supply of pure water, while there is available a 130-pound pressure for fire protection. This is sufficient to send an inch and a quarter stream over our tallest building. The total expenditure in this connection was \$6,667.93.

The mining operations are carefully laid out in the well equipped draughting room, after which they are projected and checked below ground. All of the working plans are kept up to date, and a high degree of accuracy is insisted upon.

As stated, the survey of Placer Lease No. 1077 required running about 25 miles of survey line; in addition about 15 miles of line was run and measured in the location of the additional leases and mineral claims. The common method of staking mining ground is to use a pocket compass and pace the distances, but these methods are not accurate enough when dealing with such an extensive area. In our case accurate methods were used, with the result the maps of the property may be depended on as being correct.

DRILLING DEPARTMENT.

Intensive drilling was carried out during the season on the Wingdam Section, and by the end of November the preliminary drilling of this section had been completed. As last winter we found it very expensive to carry on with drilling during the severe weather, and since the same urgency did not exist, it was decided to suspend all such work until spring.

During the first portion of the season we had two Keystone drills continuously employed. These were augmented in September when a third Keystone was purchased at a very reasonable price.

At the close of 1934 one drill was operating on the "I" line of bores and the other on the "J" line. Early in the year the "I" line was completed, and the cross-section of this line shows a very interesting geological formation. The channel is split into two portions with a Quartzite dyke between them. This rises to over 100 feet above the deep channel and the crest of the same reaches to about 69 feet below the surface. It will be interesting to investigate this further when the same is exposed by the gravel drives. It would appear that in the vicinity of this line a bar in the deep channel may exist which would account for the exceedingly rich values found in the deep channel by former drillings and by the horizontal drill holes put out from the No. 1 workings, which are located about 500 feet upstream.

This cross-section also proved that the inter-glacial deposit now being mined at the Sanderson Mine extends downstream for at least 3,100 feet from the Sanderson Shaft.

The considered opinion, based on the drilling records, and the results of the various test pits within the Sanderson Mine, is that the life of that mine is at least another four years.

The additional holes were put down opposite the No. 1 Shaft to properly define the deep "gutter" at the point where the leading reef drive from the Melvin Shaft underlays the same.

The drilling on the "J" line of bores, 800 feet downstream from the Sanderson Shaft, revealed the existence here, also, of the inter-glacial deposit, which at this point lies on a bench of the reef rock on the southerly side of the deep channel. The values disclosed here are much larger than those so far disclosed in the Sanderson Mine. Although nearly all the value occurs between 100 and 120 feet below the surface, the ground is so rich that a calculation indicated that taking from the surface down it would average \$1.49 per cubic yard.

Two check holes were put down midway between the Sanderson Shaft and the "J" line, on what is designated the "B B" line. These proved the continuance of the inter-glacial deposit at the calculated depth, with values comparable to those disclosed by the "J" line.

As indicative of the care that must be expended on the drilling and the later interpretation of the same, it is to be noted that three holes were put down on the "G" line of bores under the late management in 1933. Through not realizing the probable position of the deep channel, the holes were spaced too far apart—namely 250 feet, with the result that the channel was passed over without discovery. During the season we completed the drilling of this section, and located the channel between the number one and number two holes. As far as the drilling was carried on this line, the overburden on the Tertiary gravels consisted almost entirely of clay. It would appear probable that the continuance of the inter-glacial deposit might be expected to be at a considerable distance to the south of the deep channel in this vicinity. This will be investigated later.

This line of bores is located about 1,100 feet upstream from the Sanderson Shaft.

During the latter part of the season five holes were drilled on the "K" line of bores, situated some 1,200 feet upstream from the "G" line. The results obtained from drilling this line were not entirely satisfactory, as the surface is badly faulted here, and it is evident that

the same condition exists as to the bed-rock. While the deep channel was pretty well defined, the inter-glacial deposit was not in evidence. A further extension of the drilling to the south might disclose the same.

As the course of the deep channel has been pretty well defined through the Wingdam Section, it is proposed to concentrate the drilling during 1936 on the Beaver Pass Section. Here the valley attains its greatest width, and already across the same a line of bore holes has been laid out which is a mile in length. The character of the surface may be judged from the fact that at no point does this line rise more than 40 feet above Lightning Creek.

The drilling of this section will not only define the deep channel, but will decide whether, as seems probable, a large dredging area exists here. In addition this line should pick up the pre-glacial run from Peters Creek, which has been proven to exist further up that Creek.

For the preliminary investigation the lines of bore holes will be spaced at greater intervals than was the case in the Wingdam Section. The exact spacing has not yet been decided on, but will probably be some 2,000 to 3,000 feet apart.

A large amount of exceedingly important information has been collected from the drilling logs, and as this is of prime importance to the Company, and has been obtained at a considerable cost, it has been considered advisable not to disclose the same to the public at this stage. On this account details as to gold values at specific points will not be included here. It will be sufficient to state that the officers of the Company are well satisfied with the results obtained and the values disclosed by the year's drilling.

Total number of feet drilled from June 30th, 1934 to December 31st, 1934	1,628 feet	
Total number of feet drilling from January 1st, 1935 to December 31st, 1935	4,782 feet	
	<hr/>	6,410 feet
Total cost of drilling from June 30th, 1934, to December 31st, 1934 \$	4,234.47	
Total cost of drilling from January 1st, 1935 to December 31st, 1935	16,377.46	
	<hr/>	\$20,611.93

Section 2.

GENERAL REPORT FOR 1935

COVERING PRESENT DEVELOPMENT AND FUTURE PROSPECTS

DEVELOPMENT.

Keystone Drilling from the Surface.

The section on drilling, prepared by Mr. Leroy Cokely, shows that up to the end of November 4,782 feet of bore holes were drilled from the surface. Drilling then ceased for the year owing to climatic conditions.

Most of this drilling was necessary to delineate the course of the ancient "gutter", but at the same time a close watch was kept on the sludge from the drill holes, tests being made every few feet in order that intermediate concentrations of gold could be located. In the interglacial deposit, some very remarkable results were thereby obtained, especially from the "J" line of drill holes.

As regards the pre-glacial gutter, sufficient drilling has now been carried out on the Wingdam Section to allow us to follow, with a fair degree of accuracy, its sinuosities for two miles.

PRE-GLACIAL DEPOSITS.

Melvin Shaft Development.

This 4-compartment shaft was completed early in the year although progress was hampered on several occasions by small "bursts" of slum from the old Jones Level. The present seal in this old level is close to the shaft, but small quantities of fine slum sometimes filter through the fractured rock and also along a fault line into the sump. There is just sufficient of this very fine slum in suspension in the water to damage the pump. We are at present considering a plan of working in past the present seal in the Jones Level until we reach a point where the rock is solid, and putting in a permanent dam there.

No. 1 or Unverzagt Shaft.

It has always been known that a very rich section of the Tertiary "gutter" lay in front of this old shaft. This we were able to verify, between bursts of slum, by our horizontal drilling.

For over 20 years, periodic attempts have been made to enter these rich gravels from the Unverzagt level, which is practically on the same level as the bed-rock. These many attempts have all failed owing to repeated bursts of high pressure slum. This slum was usually pumped to the surface, and further attempts made, with similar results. These repeated bursts of slum have caused serious caves, three of which, under my own observation, have reached the surface a few feet away from the river. To make matters worse, the 26-inch Janssen drill hole was sunk in the same vicinity.

A large Layne and Bowler pump was installed in this hole and is reputed to have pumped large quantities of slum and sand before it became "sanded up". On the 8th August, 1935, this hole caved to the surface, and a wing-dam had to be rushed in to the river to keep it away from the "cave".

We may take it as axiomatic that the only safe method of entering these gravels is by means of the main reef drive from the Melvin Shaft, and then only after the water pressure has been reduced to safe limits by means of drill holes bored up from the main reef drives. I cannot over-emphasize the importance of carrying out the above policy. Enough experimenting has been done and money spent over the last 20 odd years in this No. 1 Shaft to make it obvious that the progress of development of this property would have been considerably further advanced had we forgotten there ever was such a thing as the No. 1 Shaft.

On the other hand, our operations from this shaft did at least enable us to obtain very valuable data, by horizontal drilling, which confirmed the high values reported as the result of surface drilling in the past, which had often been doubted.

Of the many drainage holes drilled from the rock faces in the No. 1 Shaft workings, three holes were drilled in a horizontal position for the location of the deep "gutter"; and, as indicated in Section 1, extraordinarily high values in heavy "gutter" gold were recovered from each of these holes.

I attach the utmost importance to these tests as they further confirm, beyond reasonable doubt, the high values reported in surface drilling prior to my taking charge.

The recovery of these values at this point, when compared with the values reported by surface drilling under previous management on the "C" and "D" lines respectively 1,400 feet and 2,800 feet downstream, and with the values recovered by ourselves last year on the "H" line 3,800 feet downstream, all as set forth on page 14 of my 1934 report, indicates the continuity of this rich deposit over at least the latter distance. The breadth varies from 200 feet down to 60 feet, and I consider a safe average would be 90 feet, with a "mineable" depth of 6 feet. It will be understood, of course, that the narrower the deposit, the greater the probable concentration.

INTER-GLACIAL DEPOSITS.

Sanderson Mine—Underground Test Pits.

In the Sanderson Mine, every one of a dozen test pits put down in the blank area to the east of the "pay streak" opened out by the previous management, showed payable gold lying a few feet below that level. As this lower horizon correlated with the exceptionally high values disclosed in the "J" line of drill holes about 800 feet "downstream", and also with two verifying holes drilled about halfway between these points, it seemed obvious that the old management had opened out the Sanderson Mine at too high a level.

We considered that the quickest way to develop this new "find" was to drive a dip slope into it, and accordingly "Scott's Dook" was started at a dip of one in eight. When the "Dook" had been advanced sufficiently to control eight feet of the lower gravels, "Knowles' Level" was started to the east at right angles, and it is from the development of this horizon that our increased recovery of gold is coming.

It is our intention to continue "Scott's Dook" another 100 lineal feet which will give us sufficient depth to control the whole area right down to and beyond the "J" line of drill holes. This area, together with the development north from "Knowles' Level", should give us sufficient pit room to work the output, here, up to 1,000 cars per day. When "Scott's Dook" has reached the calculated depth, a level connection will be made with the Sanderson Shaft. This connection will be wide enough to form an assembly station for mine cars. A pump station will be made at the bottom of "Scott's Dook" and the mine water pumped direct to the surface through a drill hole. With the establishment of this pump station, it will be possible to remove all the pump columns from the Sanderson Shaft and so leave room for a second cage. This work is well in hand, and it is expected that we will reach our objective of 1,000 cars per day in the course of a few months.

With the expected increase in the number of men employed underground, it has been found necessary (owing to the exigencies of the Mines Act) to arrange for a second exit from the mine. This is being met by the driving of a rising tunnel from the workings to the surface, which it will reach at a point adjacent to the Company's sawmill. From this point mine timbers and logging can be delivered to the mine with a minimum of handling and cost.

Although we are now recovering comparatively high quantities of gold from the few parties of men employed underground, much of the work being carried out can only be classed as development or pre-production; two parties driving respectively to the sawmill outlet and to the "J" line are solely on development.

The area being opened out is cut up into pillars approximately 65 feet wide and 100 feet long, by means of leading drives and cross-cuts. When we have reached a prescribed boundary, the pillars are taken out slice by slice **on the retreat** with an expected drop in production costs.

This system is analogous to the working of a highly inclined vein, in a quartz mine, where the levels and raises are driven to develop the stopes, which are the equivalent of pillars in our case.

We estimate that, as a result of the underground development and surface drilling so far carried out, enough of the inter-glacial moraine has been located to maintain an output of 1,000 cars daily for at least four years.

In considering values, the most reliable guides are bulk-tests, which show the following results:—

Month	No. Cars	Cubic Yards	Gold Recovered in Ounces	Dwts. per Car	Dwts. per Cubic Yard
October	3,612	1,519	178	.986	2.344
November	7,487	2,947	338	.903	2.294
December	9,822	3,198	693	1.411	4.334

The average cost, including overhead, depreciation, and the whole development cost of this operation, during these three months, was \$4.67 per cubic yard mined.

It is considered that, when the stage of "retreat mining" is reached, in which no development is involved, the cost per cubic yard can be reduced to \$3.50.

Adopting an average of 1.25 dwts. per car, on the basis of 1,000 cars daily, our monthly production at 26 days per month would total 1,625 ounces from this operation. At a nett production cost of \$3.50, there would be an ample margin of profit.

It should be noted that the number of cars of gravel per cubic yard mined varies from roughly 2½ to 3 cars, according to the amount of boulders encountered.

During October, only the old upper level in the Sanderson Mine could be worked, pending preparation of developments, and in November the major portion of the gravel was still mined from that level during actual development to the lower level. By December, development work was sufficiently advanced to permit of the transfer of parties to the lower level.

Full car tests from four test pits sunk into this lower level gave an average of eight dwts. per cubic yard, which has not yet been reached in actual mining, due partly, no doubt, to the fact that the two parties on development have often not been in payable gravels.

The development drive to the "J" line should reach that point about end April, and, based on the results obtained there by drilling from the surface, much increased values per cubic yard should be obtained.

The outstanding features of development during the year may be summarized as follows:—

Pre-glacial Deposits.

The commencement of the main reef drive from the Melvin Shaft under the pre-glacial gutter, and the bringing over of drainage from the No. 1 to the Melvin Shaft by the use of the vertical drainage method.

The recovery by horizontal boring of high values from the pre-glacial gutter at three separate points in the No. 1 Shaft levels, confirming in large measure the high values reported by surface drilling many years ago about the same points, and those obtained by ourselves last year on the "H" line of boreholes, 3,800 feet downstream from this shaft.

The locating of the gutter on the "G" and "K" lines of bore holes.

Inter-glacial Deposits.

The important development of the inter-glacial moraine to the extent that, as predicted in my report for 1934, it promises to establish the Sanderson Mine as a regularly profitable producer for some years to come.

The proving of this deposit from 1,000 feet upstream from this shaft to the "I" line of bore holes, 3,200 feet downstream from the same.

The extraordinary high values discovered in this deposit on the "J" line of bore holes.

The successful adaptation of the sluicing plant to a point at which, with the Lorentsen machine, a 99% recovery is obtained.

The production, in spite of the power house fire, of 2,498 ounces of gold, with a sustained monthly increase since the fire loss replacement in October.

Survey and Drilling.

The great amount of valuable work accomplished by Mr. Cokely and the survey staff, in connection with the Company's leases and the recording and co-ordination of drilling data.

The large footage of Keystone churn drilling accomplished, totalling 4,782 feet.

Pumping.

The large total of 248,000,000 gallons pumped.

General.

The great general improvement to the camps, comprising the construction of a permanent dam in Ramos Creek and the piping of the water supply over a distance of one mile, providing ample volume for both domestic use and fire emergencies, establishment of a doctor's clinic, well conducted pool room, and new mess hall at the Sanderson Mine camp.

CONCLUSION

The progress maintained in the development of your property up to the date of the fire was systematic and continuous, and it is hard to assess in terms of cash what this disaster has meant to the Company. The loss of four months' valuable time in development alone is a tremendous handicap. No less than 40,000,000 gallons of water have to be pumped out to put us where we were on 10th August.

Our organization, of which we were deservedly proud before the fire, was completely upset and is only now re-approaching normal.

The rush to get the new power station in before the cold weather set in was not conducive to economy although every employee was doing his utmost.

In spite of these unfortunate handicaps, I believe we can look forward to 1936 with the greatest of confidence. Every effort will be strained to get the Melvin Shaft functioning again as a drainage centre at the earliest possible moment, while the Sanderson Mine is developing so rapidly that it promises to provide enough revenue to meet our total monthly commitments.

This report would not be complete without my putting on record my deep appreciation of the loyal and unremitting work carried out by every member of the staff during a period of great stress.

The thanks of the Company are also due to the Cariboo Gold Quartz and Island Mountain Mines for their very practical sympathy during the fire period.

It is also worthy of note that Mr. Tom Scott, a mining engineer of wide experience, was added to the staff as Mining Manager toward the end of the year. This appointment should relieve me of many responsibilities and leave me more time for the work of the further development of this large property.

Yours faithfully,

D. CAMPBELL MACKENZIE, M. Inst. M.M., M.A.I.M.M.
General Manager and Technical Adviser.

1st January, 1936.
Wingdam, B. C.