REPORT

ON

THE ELIZABETH GOLD MINE
ATIKOKAN, ONTARIO.

BY

C. H. MILES, M.E.
GEOLOGIST.

November.
1935.

Fort William, Ontario.
November 30th, 1935.

W.L.Doyle, Esq.,
Manager,
Elizabeth Gold Syndicate,
Toronto, Ontario.

Dear Sir:-

Pursuant to your request for a report on the Elizabeth Gold Mine, I have pleasure in submitting herewith, a summary of my examination and investigation of your property during the past summer.

It might not be amiss to suggest that to do real justice, with a view to expounding the merits of a property like the Elizabeth Gold Mine, one would require to spend at least a month in order to give the property the thorough examination that it warrants.

However, during my three short visits during the summer, while I was principally engaged in sampling, I covered sufficient of the area to convince me that you have a genuine mine-making possibility.

Unfortunately for the district in general, gold occurrences were first found to exist at a time when metallurgical appliances were far inferior to what they are today, with a resultant low percentage of free gold extraction, coupled with their inability to treat complex gold ores, which condition inevitably results in failure, due in no way to the lack of gold content in the ores, but rather to the limited knowledge of how to successfully treat the gold ores, so as to make the operation commercially profitable.

Do not lose sight of the fact that in the Province of Ontario, and in your District in particular, there are today more mines producing gold bullion than at any previous period. Properties which for years have lain idle through scepticism and a pessimistic attitude on the part of the operators and public alike, today are numbered amongst the ranks of gold producers, largely due to tenacity and faith displayed by persons or groups, as was the case with the Porcupine and Kirkland Lake districts in their early days.

Furthermore, it is a noteworthy fact that gold values and enrichments have been found to improve with greater depth, and I have every confidence that your efforts with respect to the Elizabeth Gold Mine will meet with the success that is so justly merited.

I am, dear sir,

Yours very truly,

"C.H. Miller"

Mining Engineer and Geologist.

THE ELIZABETH GOLD MINE

This property is situated on the North Shore of Rice Lake, in the Fort Francis Mining Division, Rainy River District, Ontario, approximately four miles north of the Canadian National Railway, and five miles north-west of the Town of Atikokan.

The property was formerly owned by the Anglo-Canadian Mines, Limited, of London, England, of which Mr. Alan Sullivan, C.E., was Canadian Representative.

Records and statistics of the early days of Canadian Mining contain frequent mention of this property, but as a considerable amount of development and mining took place subsequent to the date of these reports, their reliability and value for present day operations are therefore very limited.

It may be interesting to mention that a diamond drill was employed in successful operation for the purpose of blocking out development work, and that the mine actually commenced to turn out gold bullion at the beginning of 1903, the feeling at that time being that the mine had justified expectations that it would prove a profitable property to operate.

GEOLOGY:

The formation of this property consists of

1. Granite (Algoman) or Protogine.
2. Lemprophyre 'Algoman later than Granite possibly from the same Magma).
3. Greenstone Schist (Keewatin).

The main break on the location is referred to as Vein No.2, in the contact of Protogine or altered Granite, and Greenstone Schist.

It is difficult to say what the character of the Greenstone schist was originally. Its appearance indicates that it was probably diabase or trap and related material. The schist is later than protogine. After the granite eruption, the granite cooled, contraction took place, and a line of fractures was formed along the contact, more so into the granite than into the greenstone schist. These fractures became the seat of mineralized quartz. Later disturbances subjected the rocks to great pressure and caused them to take on a schistose or laminated structure. The early fractures along the contact reopened and were invaded by material, which on cooling and solidification gave rise to lamprophyre. Fine examples of these are.

(a) No.1 Vein - a straight fracture from the contact fracture.
(b) A parallel fracture 100 to 150 feet East of Shaft No.2.
(c) The vein back of the office in protogine, which is a further fracture from the contact north into the granite.
(d) The vein facture East of the cook house which is also a straight fracture from the contact.

(e) A parallel fracture is found West of the North outcrop of the contact on both sides of the road for a distance of 450 feet and more.

(f) Nearly half a Mile North in a fold of the contact, a straight fissure extends Northward, and is known as the Tunnel Vein.

The contact begins at the South-west portion of the property, trends northeast to about the centre of the property, and then swings to the North-west.

The vein gangue in all the fractures and fissures is quartz and lamprophyre. I surmise that the lamprophyre magma produced the vein-forming solutions and minerals.

The veins and formation on this property are very similar to those of the Lake of the Woods, Sturgeon Lake, Sturgeon River and Long Lac areas particularly. The vein on the St.Anthony Mine at Sturgeon Lake is in a greenstone and granite contact, the working shaft in the greenstone on a straight fracture from the contact. This property, after many attempts, is now in the rank of gold producers, and conditions are analogous to your No.1 Vein.

The veins of the Mikado Mine on West Shoal Lake, now owned by Ventures Limited, the Howey Mine, operating at Red Lake, and the majority of veins in Northwestern Ontario, Quebec and Manitoba, are found in or close to

granite contacts. Some of the veins run into or lie wholly in granite. The greater part of the gold is free, accompanied by copper, iron and lead sulphides. Along these contacts and veins, quartz porphyry is often found, due to the granite and originated from the granite magma. Many porphyry dikes along quartz veins and in greenstone schist have been altered to felsite. It is an established fact that the highest gold values follow the granite contact very closely and often appear in chimneys.

The Elizabeth contact vein is one of the largest of the above type in Northwestern Ontario. Along its length will be found a number of rich chimneys that will increase the average values in the vein. The rich pockets or chimneys may lengthen with depth as in the Howey Mine and in the St.Anthony above mentioned.

The facts are that exceedingly rich ore has been found to occur in this type of vein, and the prospects for the Elizabeth Mine are therefore most promising.

VEINS:

There are two main breaks or vein systems on the Elizabeth property known up to the present time.

1. The contact fracture, irregular, with numerous sharp folds, yet holding to a general line.

2. A break striking West from the contact vein, about 1300 feet North of shaft No.2.

These breaks or dikes are of lamprophyre in protogine. In places the protogine is broken up and cemented into lamprophyre.

This zone of dikes is about 100 feet in width, along which, to the North and South, are quartz veins, and a network of quartz stringers in lamprophyre. The vein system extends beyond the Western boundary to the contact of greenstone schist.

Whereas geological information covering the district indicates that the entire country to the West is of protogine formation, in fact, the protogine has been found to have a width of not over half a mile. The Western contact of the protogine has never been examined or prospected at any time, and it is therefore an interesting point to have it said that the country surrounding the Elizabeth location is virgin territory, from a standpoint of mining possibilities.

The Western break has had no work of any kind done on it. The quartz is of the same structure as in the contact vein and gold values will be found here too, given intelligent investigation.

Shaft No.1 is 460 feet South of Shaft No.2, and the vein strikes E.45 °N. The dip is vertical. North of No.1 shaft is a trench to a length of 50 feet, showing a vein 4 feet wide, and highly mineralized with iron pyrite, some chalcopyrite, and gold. The shaft, as old reports show, is 110 feet deep. At a depth of 60 feet from surface, is an 80 foot drift. I found no record as to whether the drift is North or South of the shaft. The vein in the shaft was sampled downward for 20 feet from the surface. All samples were taken over half of the width of the vein, dividing the vein into East and West halves. The first four samples are from the West half of the Vein, are marked 51, and the East half marked 51-A. Later, the samples from the East half are marked with even numbers and the samples from the West half marked with odd numbers, both on the North and South face of the vein. The average sample was taken over 3 feet 6 inches, or two samples over a width of 7 feet. On the North face of the vein, the West half is high in gold values, and on the South face, the East half of the vein runs high. The reason for this peculiarity may be explained when more of the vein can be studied.

Vein No.2, or contact vein, has No.2 shaft, 242 feet deep, with three working levels. The first level is 63 feet from surface, and 95 feet long, to the North. The drift follows the contact fro 30 feet to where the contact turns to the East, from which point the drift follows the fracture to the North. The ground from the shaft over a length of 60 feet, has been stoped to within a very short distance of the surface. It appears that

the stoping was only done toward the granite side of the contact, therefore the lamprophyre, or East side, will still have a considerable tonnage in place. The drift is 5 feet in width. In the face of the drift, this material consists of fractures of quartz veinlets, which form 50 per cent. of the face of the drift. Sampling across the face of the end of the drift gave low assays, being apparently the North limits of the ore shoot, but the wall on the lamprophyre side gave good values, as $4.20 over 60 inches, and $5.95 over 48 inches, where the contact leaves the drift.

Some exceedingly high grade ore remains in place in the pillar between the shaft and the stope, as well as in the roof of the stope. Sampling of the former has given average values of $33.60 and from the appearance of the ore in the back of the stope, which can not be reached for sampling, it will carry at least the same average.

A sub-level opening from the shaft is found 24 feet above the second level. Here the lamprophyre shows a width in the shaft and cross-cut of 13 feet, but stoping done on this level through to the first level shows that more mining was done on the lamprophyre than on the protogine side. There still remains 12 to 14 feet of quartz in place on the East wall. Eleven samples were taken, mostly off the East wall, from the shaft opening to the North end of the stope, where entrance is made into the second level. The average of these samples gave $21.63 per ton. The sub-level stope is 60 feet in length.

Some exceedingly high assays have been obtained from the south end of the stope- channel sampling up to $175, and an undetermined tonnage of this rich ore still remains in place.

The second level is 135 feet from the surface, and has been driven to the North 243 feet. 50 feet from the shaft is a low stope, 20 feet high, and a 3 foot underhand stope.

This point is evidently on the rake of the ore shoot, which dips to the North, and channel sampling of the roof, walls and floor of this chamber gave some very high results. Along the protogine side, 3 samples averaged $29.87, and along the East or greenstone side, 4 samples averaged $32.02. This is the spot where the last mining was done by the former operators and they had made a start toward following the values down, an expensive method of mining, rather than to have made a connection through with the third level.

217 feet from the shaft is a winze, supposed to be 70 feet deep. 17 feet from the winze is a cross-cut following the contact North 25°W. for 16 feet, and a cross-cut following the contact N 80° E for 21 feet 6 inches. Another cross-cut extends N75° Efor 22 feet, all in protogine, without any fracture showing.

The first 50 feet from the shaft are in quartz and lamprophyre. The drift is 100 feet in width. At 50 feet it widens out to the East 2 feet, and to the West 10 feet, until it reaches the protogine and its fractures. This makes a room 22 feet wide, 35 feet long, and 20 feet high. There are about 60 tons of ore lying on the floor.

From here the drift follows the west side along fractures in the protogine for 25 feet, then turns East for 15 feet, and again North along the contact. At the North turn stoping was done to a height of 12 feet for a length of 20 feet. Most of the ore is still in the drift. The vein has an average width of 6 feet and for a length of 80 feet no stoping has been done.

The South drift begins 19 feet North of the shaft and is a crosscut for 40 feet in lamprophyre, to the contact. Then it follows the contact South for 66 feet. At 54 feet there is a short cross-cut 7 feet long, driven into lamprophyre. The quartz showing is narrower than in the North drift.

In all, 107 samples were cut across the roof of this level in channels 2 inches wide.

The third level: the shaft is in the contact and the North drift follows the contact. The vein material is 40 inches wide at the shaft. This width increases and 50 feet from the shaft the vein was sampled over a width of 17 feet. At this point are two cross-cuts, one

one to the North-west, and the other to the East. The North drift extends 81 feet beyond the cross-cuts, according to the records of the mine. Both the North drift and the East cross-cut are filled with waste material taken from the North-west cross-cut, and it looks as if this later was made purposely to provide material for filling the North drift, and the East cross-cut. In the North drift I was able to cut a sample that gave every indication that the old timers were hiding good ore. In fact, I am convinced of it. The average assays along the ore body gave an average of $11.77.

South of the shaft, the contact is trending South-east for 37 feet, then turns to the South-west. Here the vein is narrow and appears in a pinch and folding zone. The lamprophyre is visible in a narrow band along the quartz vein. Here for the first time in the underground workings the greenstone is showing.

The protogine South of and near the shaft is shattered and blocky, and aheavy inflow of water occurs.

Directly above this place on the second level, and North to the open stope, the lamprophyre has a width of 20 feet and over. The contact is 40 feet to the East of the shaft. This would indicate that a dip of the vein to the East may be expected and the vein South of the shaft may become as regular as it is to the North of the shaft.

10 feet South of the shaft is a cross-cut East for 15 feet and turning North on the strike of a narrow quartz vein for a distance of 15 feet. This drift is in greenstone.

SURFACE:

Besides the veins already described there are a number of other veins showing on the surface and several carbonate shear zones, well mineralized with iron pyrite. These veins and zones have not enough work done to go into a description of them.

On the crest of the hill, South of the North vein, a particularly interesting showing was uncovered. It appears that the contact vein connects at this point with a vein which is to be seen on the west wall of the ravine, East of the mill, but further clearing off of overburden will have to be done before we can positively state what is actually there. This vein occurrence was thoroughly sampled along its sinuous course, and values ranged up to $19.00. This is a particularly strong showing, and I strongly advise that you give further consideration to having this point thoroughly investigated at greater depth. I might suggest that this may best be done with the aid of a diamond drill. Further surface prospecting along the contact, and investigating of quartz lenses will undoubtedly disclose additional gold bearing veins on the property.

REMARKS ON ASSAYS.

The samples were taken from 6 feet to 20 feet apart, and are all channel samples, composed of vein material over a width of 2 to 3 inches, and up to 1 inch in depth. The average sample I took weighed between 5 and 6 lbs. or 6/2000ths of a ton. Of this, 3 ozs. were taken away for assay. The assays are remarkable, in that there was not a single Nil amongst them.

In places in the roof of the rift, oxidation had taken place and the values were low. The roof should therefore be broken into, and a fresh face oc the vein be sampled. Results may be considerably higher.

In sampling, care was taken that not too large pieces were taken into the sample, no free gold, and not too much material where there may be concentration of values.

I advise that bulk samples be taken, and a mill test be made. I am informed by Col. S.W.Ray, who had a close examination made of the property, at the time Mr.Sullivan was in charge, examination made by Mr. A.L.McEwen, Mining Engineer, that his report showed an average mill run of $12.00 per ton, an that Mr.McEwen claimed that recovery was not extra good.

ORE IN SIGHT.

On the first level, from the shaft, to 66 feet North, is ore

standing on the East wall, with a width of 8 to 12 feet, decreasing towards the surface. On the second level, the vein width is increased to 12 feet, as shown by the open stope. From 90 feet beyond the shaft to the end of the drift is 140 feet. No ore has been removed from the second level beyond the open stope, which extends through to the first level and over a length of above 50 feet. I figure that the second level has a large tonnage of ore above and to the East of the sub-level. The East wall contact with greenstone has not been reached. This part should be examined for values.

The third level has a narrow stope to the North of the shaft, 20 feet in height from the floor of the drift, and 20 feet in length. About 30 tons have been removed from this place. As far as the third level could be examined, no other stoping had been done.

Approximately 15,000 tons of ore are available to the North of the shaft. How much of this ore will be profitable mill ore must be determined by further tests.

The drifts South of the shaft have not been estimated for ore tonnage on account of the irregularity of the vein. I further estimate that you have 400 tons of milling ore on the No. 2 shaft dump.

I would judge from the report submitted some years ago by Mr. McEwen, M.E., that it would be profitable to retreat the mill tailings lying in the swamp and estimated to contain 10,000 tons. I am advised by your Superintendent that a 3000 ton section of the tailings was thoroughly sampled during the early part of the summer, and that the average gold content is approximately $3.70 per ton. You have therefore a considerable asset in these tailings, but it must be borne in mind that a considerable expenditure would have to be undertaken in order to provide milling facilities for the treatment of these tailings.

CONCLUSION:

Too much emphasis cannot be made of the necessity to develop to greater depth. Mining accounts of late are alive with instances of gold mines that have been smouldering many years and with renewed development have found a vast improvement of the vein with greater depth, an increase in gold content and vein width and much additional length. The limited work on the Elizabeth even now points to a recurrence of a similar nature.

I also wish to stress the mention made of your No.1 Vein on pages 3 and 5 hereof. Many mining operations of today have only a single-vein mine and at that not by any means as good as your No.1 vein. I believe that this vein is of great importance and should be further developed. There is no doubt that a continuation of the high-grade will be found to the North-east. With a small mill treating rich ore such as you have here, a comfortable margin of profit should be made.

I would strongly advise that you make provision for the installation of a pilot mill on the property so as to test the vein material by actual mill tests. Too many properties have been turned down as a result of channel sample assays. In this regard I might mention the Teck Hughes, The Hollinger, The Little Long Lac (turned down 15 times), the Howey, the St. Anthony, and many others which are now producing mines, even where channel samples gave low results.

On a vein like you have on your Elizabeth property, the width and length certainly encourages large scale mining and milling. The great number of other veins on the property will also prove to contain commercial values. It would be advisable to sink the No.2 shaft another 200 feet, and I have every confidence that you will find a downward continuation of the ore shoot, which was mined on the upper levels, and it is reasonable to expect that you will also find the lens to improve in width and length, as well, judging by the results of similar developments conducted on the properties mentioned in this report.

SUPPLEMENTARY TO MR. C.H. MILES' REPORT.

ASSAY DETERMINATIONS

For Two-week Period ending November 16th, 1935.

No.2 shaft rock dump	No.1	4.76	$166.60
	2	.62	21.70
	3	.50	17.50
	4	.21	7.35
	5	.05	1.75
	6	.08	2.80
	7	.08	2.80
	8.	.07	2.45
	9	.10	3.50
	10	.15	5.25
	11	.12	4.20
	12	.30	10.50
Check on Composite of No.1 (150 lbs.)		1.26	44.10
" " 2 "		3.12	109.20

Week ending October 26th, 1935.

Test on 2000 pounds sent to Toronto for Mill Test.

1st 250 lbs.	.45	15.75
2nd "	.54	18.90
3rd. "	.90	31.50
4th "	.96	33.60
Composite of above 4 samples	.75	26.25
5th 250 lbs.	.52	18.20
6th "	.53	18.55
7th "	.67	23.45
8th "	.45	15.75
Composite of above 4 samples (in doubt)	.40	14.00
Grab samples taken at random from 2000 lbs.	1.04	36.40
Composite on the whole lot (in doubt)	.56	19.60

Week ending October 19th, 1935.

58 - No.1 shaft north face 4' below collar.	.15	5.25
59 - West of above.	.85	29.75
60 - 2' below 58	.02	.70
61 - 2' below 59	.78	27.30
62 - North face 2' below 60	.02	.70
63 - 2' below 61	.16	5.60
64 - South face 15' 6" below surface east side.	.08	2.80
65 - " west side	.02	.70
66 - 2' below 64	.15	5.25
67 - West side opposite 66	.03	1.05
68 - 2' below 66 east side.	.61	21.35
69 - 2' above platform in greenstone	tr	
156- insub level east side, middle of stope.	.34	11.90
157 Opposite 156 on west wall	.10	3.50
158 - west wall 10' north of 157	.14	4.90
159 - east half of face 5' below floor	.20	7.00
160 - west half 5' below floor.	.16	5.60
240 - cheeks in floor Glory Hole		
- 15 below original 3 and 4	tr	
- 16 below original 9	.04	1.40
- 17 below original 12 and 13	2.41	84.35
- 18 below original 10 and 11	1.10	38.50

Week ending October 12th, 1935.

310 -	6ft north of 309	tr	
311 -	in Line with 310	tr.	
312 -	in line with 311	.08	$2.80
313 -	in line with 312	.04	1.40
313A -	in line with 313	.04	1.40
314 -	roof of north drift in line with 313	.04	1.40
314A -	north of 314	.03	1.05
315 -	top of stope - north face - west half	.33	11.55
315A -	do do east half	.29	10.15
316 -	26" below 315	.30	10.50
317 -	west and south 316	.78	27.30
318	10' north of 317	.49	17.15
319	east end south in line with 318	.17	5.95
320	south face of drift - east side	.09	3.15
321A--	Roof of stope.	.24	8.40
321 -A -	" in granite alongside.	tr.	

RECORD OF ASSAYS — ELIZABETH GOLD MINE. — OCT.10,1935.

No.		
Shaft	45	16.10
	48	34.10
	48	50.40
	63	14.00
	108	tr.
	122	4.90
1st. Level		
	101	4.20
	102	5.95
	103	3.50
	104	tr
	105	.70
	A	.35
Sub-Level		
	151	175.70
	152	3.50
	153	.70
	153A	.35
	154	22.05
	155	2.80
	156	11.90
	157	3.50
	158	4.90
	159	7.00
	160	5.60
2nd Level		
6	201A	tr.
	B	tr.
7	202A	tr.
	B	tr.
8	203A	tr.
	203B	tr.
9	204	tr.
	A	tr.
	B	tr.
	C	1.75
	D	tr.
	E	tr.
10	205	23.10
Ck		22.05
Ck		23.10
11	206	tr.
	A	tr.
	B	7.70
	C	tr.
	D	tr.
	E.	tr.
	F.	tr.
	0	tr.
207		tr.
208X		3.50
209X		tr.
210		tr.
	A	tr.
211		tr.
	A	tr.
212		tr.
	A	tr.
213		tr.
	A	3.15
	B	2.80
214		tr
214	A	tr
215		1.05
216		tr
217		1.75
218		2.40
219		tr
219	A	tr
220		tr
220	A	tr
221		tr
221	A	tr
222		tr
222	A	tr
223		tr
224		tr
225		tr
226		0.87
227		0.35
228		tr
229		tr
230		tr
231		tr
232		tr
233		1.75
234		1.40
234A		.35
235		tr
236		.70
240-1		11.20
	2	42.70
	3	tr
	4	tr
	5	2.10
	6	.35
	7	.70
	8	.70
	9	4.20
	10	1.05
	11	.70
	12	tr.
	13	.70
	14	35.70
241		.70
242		.35
243		tr.
244		tr.
245		tr.
246		tr.
247		tr.
248		tr.
249		7.35
250		.35
251		.35
252		.35
253		49.00
254		7.70
255		2.45
256		3.15
257		8.40
258		.70
259		1.05
260		1.05
261		.70
262		1.05
263		2.80
264		7.70
265		tr.
266		.70
267		
3rd level.		
300A		.70
300B		.35
300C		tr.
300D		3.85
300E		1.40
301F		.70
302		.35
303		.35
304		tr.
304A		1.40
305		.35
306		1.75
307		tr.
308		2.10
309		1.75
310		tr.
311		2.10
312		1.75
313		tr
314A		tr
314		2.80
314A		1.40
315		1.40
		1.40
		1.40
		11.15
315A		10.15
316		10.50
317		27.30
318		17.15
319		5.95
320		3.15
No.1 Shaft.		
51		24.85
51A		tr.
52		4.20
52A		15.40
53		19.95
53A		1.40
55		1.05
56		15.75
57		13.30
58		5.25
59		29.75
60		.70
61		27.30
62		.70
63		5.60
64		2.80
65		.70
66		5.25
67		1.05
68		21.35
69		tr.
Surface		
92A	1' 4"	19.25 Hill
91A	7"	4.55