

3. Fifty-four assays were made at the Government Analyst's Department; 51 of these contained no gold; two assayed a trace; and from 348 to 350 feet the core assayed 10 grains per ton.

*No. 2 Bore.—Lalla Rookh North G.M.*

1. This bore was completed at a depth of 394 feet.

2. The bore started at 21 feet in a fine-grained schist which continued to 161 feet. Between 161 feet and 216 feet is a well-defined carbonate-chlorite schist. The fine-grained chlorite continued from 216 to 315 feet, where the carbonate schist came in again and continued to 357 feet.

3. Details of the formations are as follow:—

Depth in feet.	Nature of rock.
21—102	.. Fine-grained chlorite schist.
102—125	.. Brown oxidised rock.
125—161	.. Fine-grained chlorite schist.
161—216	.. Schist country made of carbonate and chlorite.
216—315	.. Chlorite rock.
315—357	.. Mottled carbonate-chlorite schist.

4. No distinctive lodestuff was seen. The Government Analyst's Department made 55 assays, of which 53 contained no gold, one contained a trace, and from 373 to 375 feet the core assayed 3 dwt. 11 gr. per ton.

## 2.—BORING AT RIVERINA.

(For Plan of Bores see Dept. of Mines (S.M.E.'s) Report for 1929.)

*No. 1 Bore.*

1. This bore was put down at an angle of depression of 55 degrees to cut the lode below the 280ft. level. It reached a total depth of 597ft. 2in. along the direction of inclination.

2. The bore throughout its full length was in one rock formation, viz., a reconstructed amphibolite, more or less coarse in grain but of varying degrees of crystallinity.

### 3. Ore Deposits and Zones of Alteration:

Throughout the course of this bore three distinct zones of shearing and crushing—one being accompanied by a distinct quartz vein—were met with as follow:—

a. Zone 1, from 462' to 469' 9".—This zone contained a distinct lode formation from 465' to 469' 9". The assay values are as follow:—

462ft.-465ft.—Gold, a trace (under 3gr. per ton).

465ft.-469ft. 9in.—Gold, 1oz. 3dwt. 23 gr. per ton.

From 462 to 465 feet the rock was powerfully stained with biotite. Under the microscope it consisted of a mass of shapeless red-brown scales and cleavage strips of biotite set in a more or less water-clear material resolvable by high powers into a granular mass of quartz and felspar. This special granular mass and biotised rock—finely schistose—is evidently a feature of the hangingwall of the shear zone containing the lode from 465ft. to 469ft. 9in.

In the shear zone it is clear that this biotite rock has been formed by dynamic stress, heat and pressure, and has resulted from the breaking up of the hornblende of the reconstructed amphibolite.

From 465ft. to 469ft. 9in. is true siliceous pyritic lodestuff formed along a line of shearing. This lodestuff is quite interesting from the fact that it contains tourmaline and microcline. Under the microscope the lodestuff is made up of microcrystalline granular quartz and felspar with some biotite scales and rods of pale brown tourmaline, arranged parallel to the planes of foliation or schistosity.

This tourmalinised quartz-felspar schist is traversed by a coarse-textured mosaic of quartz—with a pseudo-elastic appearance—and occasional remarkable plates of microcline.

The tourmaline rods lie parallel to the quartz veins, and the microcline seems to frequent the borders of the secondarily introduced quartz. Iron pyrites (and possibly pyrrhotite) occurs in grains and veinlets cutting across the planes of foliation.

The hanging-wall rock from 451ft. 9in. to 460ft. 10in. was also assayed with the following results:—

451ft. 9in.-455ft. 10in.—Gold, nil.

455ft. 10in.-458ft. 3in.—Gold, 5gr. per ton.

458ft. 3in.-460ft. 10in.—Gold, 5 gr. per ton.

The footwall rock, represented by a specimen from 471 feet, was normal reconstructed amphibolite. Under the microscope it consisted of bunches and ragged plates of hornblende set in water-clear material made of a microcrystalline aggregate of quartz and felspar. No biotite was seen. A little more crushing would convert this rock into a hornblende schist.

b. Zone 2, from 504ft. 9in. to 509ft. 10in.—Between these depths there occurred another zone made up as follows:—

504ft.-506ft.—Granulated biotised schist.

506ft.-509ft. 10in.—Glassy quartz—slightly pyritic.

The assay results gave:—

504ft.-506ft.—Gold, 5gr. per ton.

506ft.-508ft.—Gold, nil.

508ft.-509ft. 10in.—Gold, 5gr. per ton.

The hangingwall rock from 504 to 506 feet was seen under the microscope to be a pyritic biotised granulated quartz-felspar schist (like that in Zone 1) with scattered grains and plates of hornblende traversed by veins and impregnated with patches of coarse silica mosaic and some carbonates.

The footwall of the quartz reef from 506ft. to 509ft. 10in. is reconstructed amphibolite grading into hornblende schist. Under the microscope it consists of bunches and sheaf-like aggregates and bundles of green hornblende separated by colourless interstitial material made of micro to almost microcrystalline mosaic of quartz mainly with traces of biotite.

c. Zone 3, from 383ft. 5in. to 588ft. 4in.—Between these depths was still another distinctly biotised and in part strongly schistose zone. According to assay results Zone 3 contained no gold. Core from this zone has not been microscopically examined, but macroscopically the zone appeared to contain—

(i) granulated biotised schist,

(ii) siliceous quartz rock, and

(iii) strongly schistose actinolite quartz rock.

### Conclusions.

Petrographic investigations indicate that this bore passed through the three shear zones described under a, b and c, viz.:-

- a. Zone 1: 462ft.-469ft. 9in.
- b. Zone 2: 504ft.-509ft. 10in.; and
- c. Zone 3: 583ft. 8in.-588ft. 4in.

With the exception of the comparatively rich 4ft. 9in. of lodestuff from 465ft. to 469ft. 9in. in Zone 1 (a), the values were negligible.

These three zones all contained the curious granulated biotised rock—mostly on the hangingwall. They resulted from the breaking down and crushing under heat, solution, and pressure of the reconstructed amphibolite in which they occur. The rich lodestuff in Zone 1 (a) from 465ft. to 469ft. 9in. is of considerable interest on account of the microcline and tourmaline it contains. It looks as if it is in some way connected with acidic residual solutions which have been forced along and between the foliation planes of the schisted rock in the shear zones.

### No. 2 Bore.

1. This bore was completed at a depth of 525 feet.

2. The following is the succession of rocks passed through:—

Depth in feet.	Nature of rock.
20—210	.. Rotten decomposed amphibolite.
210—240	.. Reconstructed amphibolite.
240—243	.. Pyritic siliceous actinolite rock with granular sphene and microcline—a grade of lodestuff.
243—261	.. Chlorite-carbonate actinolite schist containing magnetite.
261—340	.. Amphibolite; semi-schisted and containing distinctly schisted bands, with a band of epidote rock from 264ft.—265ft.
340—437	.. Amphibolite of varying grades of crystallinity, grading into hornblende schist.
437—448	.. White quartz reef.
448—516ft. 6in.	Amphibolite.
516ft. 6in.—520ft. 9in.	Patch of oxidised schist.
520ft. 9in.—521ft. 6in.	Rock somewhat schisted, slightly pyritic and epidotic.
521ft. 6in.—525ft	Amphibolite.

3. One hundred and eleven (111) assays were made in the Government Analyst's Department: 98 yielded no gold at all; seven yielded traces; one 5 grains per ton; four yielded 3 grains, and one yielded 1 dwt. 5 grains per ton.

### 3.—BORING AT MT. ZION GOLD MINE.

(For Plan showing bores, see Dept. of Mines (S.M.E.'s.) Report for 1929.)

#### No. 2 Bore.

1. This bore was put down at an angle of depression of 65 degrees with a view to cutting the lode at deeper levels.

2. The total depth reached was 481 feet 8 inches.

3. The country rock of this bore was the same throughout, viz., a somewhat mottled greenish rock due to an admixture of chlorite and carbonate, the latter often forming bands. The rock on the whole was more or less schisted. Its origin is doubtful, but it was more than likely some ultra-basic rock.

4. The bore passed through no less than six zones of a perfectly banded black and white jasper. These zones will be referred to as lodes. Their positions along the bore are as follow:—

Depth in feet.	Width.
	ft. in.
Lode 1—150ft. 6in.—156ft. 3in.	.. 5 9
Lode 2—191ft. 4in.—200ft. 6in.	.. 9 2
Lode 3—251ft. —258ft.	.. 7 0
Lode 4—263ft. —307ft.	.. 44 0
Lode 5—341ft. 6in.—352ft.	.. 10 6
Lode 6—431ft. —466ft. 7in.	.. 35 7
Total	.. 112 0

The total thickness of these jasper bodies along the direction of the bore is therefore seen to be 112 feet.

5. *Values.*—The values derived from these so-called "lode formations" may be summarised as follows:—

Lode 1: 150ft. 6in. to 156ft. 3in.

Values: 150ft. 6in.-153ft.—Gold, trace.  
153ft.-156ft. 3in.—Gold, 8 grains per ton.

Lode 2: 191ft. 4in.-200ft. 6in.

Values: 191ft. 4in.-195ft.—Gold, trace.  
195ft.-197ft. 6in.—Gold, 1dwt. 2gr. per ton.  
197ft. 6in.-200ft. 6in.—Gold, 11dwt. 0gr. per ton.

The rock from 197ft. 6in. to 200ft. 6in. was a heavily pyritic phase of the black and white jasper. The pyrites occurred in patches and partly as crystals. Some secondary veins of quartz and carbonates were noted.

Lode 3: 251ft. to 258ft.

Values: 249ft. 6in.—255ft. Gold: 13gr. per ton.  
255ft.—258ft. Gold: trace.

Lode 4: 263ft. to 307ft.

Values: 263ft.—268ft. 6in. Gold: 5gr. per ton.  
268ft. 6in.—272ft. 6in. Gold: 1dwt. 12gr. per ton.  
272ft. 6in.—276ft. 9in. Gold: 1dwt. 0gr. per ton.  
276ft. 9in.—281ft. Gold: 2dwt. 9gr. per ton.  
281ft.—285ft. Gold: 1dwt. 7gr. per ton.  
285ft.—289ft. Gold: 17gr. per ton.  
289ft.—293ft. 6in. Gold: 1dwt. 18gr. per ton.  
293ft. 6in.—297ft. 6in. Gold: 17gr. per ton.  
297ft. 6in.—299ft. 6in. Gold: 3gr. per ton.  
301ft. 6in.—307ft. Gold: 10gr. per ton.

Lode 5: 341ft. 6in.—352ft.

Values: 341ft. 6in.—345ft. 9in. Gold: 5gr. per ton.  
345ft. 9in.—350ft. Gold: 5gr. per ton.  
350ft.—352ft. Gold: nil.

Lode 6: 431ft. to 466ft. 7in.

Values: 431ft.—450ft. 6in. Gold: nil.  
450ft. 6in.—454ft. 8in. Gold: 2oz. 14 dwt. 8gr. per ton.  
454ft. 8in.—458ft. 7in. Gold: 3dwt. 11gr. per ton.  
458ft. 7in.—462ft. 8in. Gold: 1dwt. 15gr. per ton.  
462ft. 8in.—466ft. 7in. Gold: 13gr. per ton.

This lode was banded black and white jasper to 450ft. 6in., at which point a change came in. The banded rock gave place to a much shattered siliceous stone between 450ft. 6in. and 454ft. 8in. Under the microscope it was seen to consist of microcrystalline quartz cut by shatter cracks and small shear lines bordered by carbonates. Carbonate and quartz veins, and some chlorite as well as jasperoid to chalcedonic silica were noted. At 450ft. 9in. was second-