GEOLOGICAL REPORT

On The

RIO PROPERTY

Slocan Mining Division, B. C.

Of

RIO RESOURCES LTD (N.P.L.)

By

E. P. Sheppard, P. Eng.
Consulting Geologist

February 22, 1969
Vancouver, B. C.

I N D E X

MAPS:

Location Map	
Plan, Rio Mineral Claim	Scale: 1" = 300'
Geology Map, Sandon, No. 273A	
Structure Sections of Slocan Series	
Topographic Map	Scale: 1" = 20'
Geology Plan, Levels 7200' & 7328'	" 1" = 20'
Longitudinal Section, Ore Blocks	" 1" = 20'

Reference:
G.S.C. Memoir 173 by C. E. Cairnes

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CONCLUSIONS - cont.

The known ore blocks may be mined from the two established levels with a minimum of preparation. Upgrading the broken ore appears possible by selective mining to a minimum width.

RECOMMENDATIONS

It is recommended that surface and underground diamond drilling be carried out on the vein structure of the Rio Mine with a view to locating extensions of the vein along strike and down-dip. Exploration beyond the walls of the shear zone into mineralized quartz porphyry masses is necessary to determine whether this rock type carries sufficient silver-lead-zinc mineralization to constitute large tonnage, mill-grade ore.

It is further recommended that Rio Resources Ltd allocate the sum of $112,000 to implement and carry out the program of exploration and development outlined in this report.

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INTRODUCTION

The following report on the Rio property is compiled from data collected on a four-day examination of the underground workings of the old mine, from checking detailed mapping and sampling being carried out by D. M. Basco, Resident Geologist, and a study of pertinent records. The examination was made during the period October 11 to 14, 1968.

PROPERTY & OWNERSHIP

The Rio property consists of Lot 2093 situated in the Nelson-Slocan Assessment District, British Columbia. It is a Crown-granted mineral claim registered in the name of Joseph Drumheller of Spokane, Washington.

The property has been optioned to Rio Resources Ltd.

LOCATION & ACCESS

The Rio property is located at the headwaters of McGuigan Creek at an elevation of 7328 feet; 117° 10' W Long., 50° 05' N Lat. The old mining town of Sandon, on Carpenter Creek, is four miles southwest; and New Denver, on Slocan Lake, lies 15 miles westerly. The Canadian Pacific Railway branch line connects with the main line at Nelson, B. C.

The property is reached by Highway 6 for 10 miles northeast of New Denver to McGuigan Creek, then by 7 miles of mountain road southeast to Antoine Silver Mine, and 2 miles along the company's switch-back road to the Rio Mine.

HISTORY

The Slocan area became active in 1891 with the discovery of silver on claims staked near Sandon. By the mid-nineties the district ranked as the most productive mining camp in the province, as regards the number of shipping mines and value of ore sold.

In the beginning the ores were mined for the high silver content but later important amounts of lead were recovered. Most of the early discoveries were small and were rapidly exhausted, or were found at depth to contain high percentages of zinc ore for which smelters took a large penalty in proportion to the amount present. Attempts at concentration were not too successful and no development at depth was undertaken.

The First World War period saw a boom in mining in the district which subsided in 1929 as a result of the drastic decline in metal prices. During the last few years, however, a renewed interest in the area has been created by the high silver prices.

The Rio Crown-granted claim was opened in 1902 and the initial shipment was made in 1903; 8 tons of ore grading 140 oz. Ag, 1.77% Cu/ton. Reportedly, 70 tons grading 295 oz. Ag, 40% Pb/ton were shipped during 1908, 1912 and 1915.

DEVELOPMENT

Development work consists of two adits and a connecting raise. The upper adit, at 7328 ft. elevation, is 210 feet in length. The lower adit, at 7200 ft. elevation, consists of 750 feet of crosscut to the vein and 410 feet of drift along the vein structures. A connecting raise 175 feet in length connects the two levels and follows the ore to the upper level.

The ore shoot was mined for a length of 40-50 feet above the lower level and an estimated 4250 tons of ore were removed. Of this tonnage, 168 tons of hand-picked material were shipped containing an estimated grade of 260 oz. Ag/ton.

GEOLOGY - GENERAL

The Slocan district lies in the Selkirk Mountain Range. It is underlain by geological formations ranging in age from Late Precambrian to Tertiary, but Precambrian measures and post-Triassic intrusives occupy the major part of this vast territory. Paleozoic and Mesozoic sediments and volcanics occur as scattered patches or narrow belts resting on a basement of the Precambrian rocks or caught up as inclusions within the post-Triassic intrusives.

Post-Triassic intrusives represented by the Nelson batholith occupy the southern portion of the area. This batholith ranges in composition from the Nelson complex of coarse, fine to medium-grained gneisses, granite and inclusions of Precambrian rocks; through non-porphyritic granite and granite diorite to Nelson granite-gneiss, and Nelson gneiss, which is crushed, partly foliated and banded granite-gneiss carrying inclusions of older rocks. This batholith is intruded into the Slocan series which consists of slate, argillite, quartzite, limestone, conglomerate and tuffaceous sediments. The Triassic period is represented by the Kaslo series of rocks consisting, for the most part, of andesitic volcanic rocks, serpentines and occasional tuffaceous sediments. The Triassic and Carboniferous period is represented by the Milford group of rocks, chiefly chert, massive and banded, slates, cherty greenstones, andesite and porphyrite. The Windermere period (Late Precambrian) is represented by the Lardeau series of crystalline schists, greenstone and green schists, crystalline limestone and paragneiss.

The Slocan series is widely exposed and contains most of the important silver-lead and zinc deposits. The series comprises a variety of sediments which are classed as slates, argillites, limestones, quartzites, conglomerates and tuffaceous beds. All gradations in textures and composition, from one variety to another, may be found. In structure they range from massive, blocky rocks to others fissile and slaty. The series has been subjected to varying degrees of local and regional, dynamic and thermal metamorphism.

Structure. The Slocan series is the most deformed of all the formations, probably because it consists of alternating bands and layers of different structural competence. Bodies of this series, and possibly earlier formations caught up in the Nelson batholith, show less deformation than the main mass of the series. The Nelson granite, in part, reached its final position by uplifting, tilting and injecting itself into the superincumbent rocks and, as the principal contact of the Nelson granite with the Slocan series, has an easterly strike. A series of flexures in this general direction have been imposed upon the Slocan strata and are particularly pronounced near the contact. In addition, the Slocan series has, as a result of regional deformation, been strongly folded along axes striking nearly northwest in line with the general Cordilleran trend.

In general, the Slocan strata lie in numerous dome-shaped and basin-shaped folds, but in detail the structure is complicated by numerous faults, zones of shearing and slipping, overturned folds, and locally, by intensely contorted strata. In the Slocan area, structure is obscure owing to lack of outcrops, key horizons and differences in the character of sedimentation from west to east.

Mineralization. Most of the important silver-lead and silver-lead-zinc deposits occur within the area underlain by the Slocan series. Mineralization has chiefly taken the form of fissure vein deposits, the fissures in most instances having a northeasterly strike and southwesterly dip. Replacement of the wall rocks is a common feature, its degree depending on the character of the enclosing rocks. For example, where it is limestone, replacement may be the chief mode of formatien of the ore deposits. The mineralization is attributed to the Nelson batholith and is regarded as having followed the period of intrusion of this batholith.

Silver is the metal of chief value in the Slocan ores. However, under present market conditions lead and zinc have also become important. Ores from the Slocan properties are composed mainly of quartz with minor lead or zinc content and are referred to as "dry ores". In most of the larger properties silver, lead and generally zinc have all been important constituents, and ores from these properties constitute the "wet ores" of the Slocan camp. The principal valuable ore minerals are argentiferous galena, tetrahedrite, freibergite and sphalerite-zinc blende. It appears that the silver content of any one ore-body bears a nearly constant ratio to the lead content. An average for the area works out to about 1.50 oz. silver to each percent of lead.

Mineralization - cont.

Ore deposits are classified as vein, replacement, spring, and detrital deposits. Fissure filling and replacement were the main processes involved. In most occurrences, however, wall-rocks have been partly replaced by the metalliferous solutions. The more important single veins follow fault-fissures and constitute profitable, but not the largest, vein deposits. They are best defined where the fissures intersect the more massive parts of the Slocan series or intrusive rocks. The fault fissures tend to stand at high angles and strike northeasterly with southeasterly dips. They appear to be controlled by a northeasterly system of steep joints.

GEOLOGY - DETAILED

The Rio claim is underlain by the Slocan series of rocks which comprise intercalated beds of slate, argillite, quartzites and minor amounts of graphitic schists. These sediments strike northwesterly and dip southwest at low angles. Quartz porphyry in the form of dikes, sills and thin fingers, intrudes the Slocan series. This quartz porphyry is thought to be apopysis of the Nelson batholith. Early lamprophyre dikes cut the porphyry.

Shear zones striking northeasterly and dipping southeasterly cut the series and are apparently developed along a joint pattern. These shears are filled with quartz vein material and mineralized by argentiferous galena, tetrahedrite, freibergite, and minor amounts of sphalerite. Wall-rock mineralization of the porphyry, and occasionally the sediments, was noted.

GEOLOGY - MINE

The upper level, at 7328' elevation, is 210 feet in length. The ore zone is represented by a quartz vein, average width 3.20', which occurs in a graphitic shear zone. This shear zone crosscuts the Slocan series and cuts beds of slates, argillites, quartzites, and quartz porphyry dikes. Mineralization was observed at the contact of the quartz vein with quartz porphyry. No significant amounts of silver were noted; however, the number of samples taken of this material were few and further investigation may prove the porphyry to be a favourable host rock.

The lower level, at 7200' elevation, has 740 feet of crosscut to the ore zone and 400 feet of drift along the zone in a northeasterly direction, which is the same vein described in the upper adit. Part of this level is flooded and could not be mapped and sampled. At the north end of the workings, #3 raise was driven through to the upper level and slashed out along the quartz vein. A stope was mined to a height of approximately 30 feet above the 7200' level. This stope was mined in mineralized quartz porphyry. The vein dies out at the north end of the

drift; however, the shear appears to continue. It is seen, therefore, that the quartz veins are lenticular within the shear zone. The vein averages 3.0' throughout its mined length.

ORE RESERVES

Ore blocks are based on sampling performed in September and October 1968, and geology mapped during the same period. The actual widths of the zones may be considerably greater than shown in the ore block calculations but average widths based on sample lengths were used throughout.

"Proved" ore was taken where there were openings on two sides and updip between levels (raises), and extended for 30 feet below the bottom level.

"Indicated" ore was taken as ore with openings on two sides, as in "B" Block, taken from the top of the raise on the upper level to surface, and for 30 feet below the bottom of "Proved" ore below the lower level.

"Inferred" ore was taken below the lower level, as in "D" Block, and projected downdip for 40 feet. No "Inferred" ore was taken along strike, although this is felt to be excellent prospecting ground.

Grades of the blocks were found by weighting samples, as shown below:

BLOCK A	Sample No.	Width	Ag oz/ton	L x Ag.
	3590	5.0'	4.90	24.50
	3591	4.0'	1.60	6.40
	3588	3.0'	5.60	16.80
	3587	5.0'	1.00	5.00
	R53	4.0'	2.45	9.80
	3589	3.0'	8.00	24.00
	3585	3.0'	8.10	24.30
	3586	3.0'	2.30	6.90
	3584	3.0'	53.15	159.35
	3583	2.0'	3.65	7.30
	3582	1.0'	16.50	16.50

Average width: 3.2'

Average grade: 8.40 oz. Ag/ton, above 7200' level

ORE RESERVES - cont.

BLOCK C	Sample No.	Width	Ag oz/ton	L x Ag.
7200 L	(3580	3.0'	2.05	6.15
	(3579	3.0	96.90	290.70
	(3599	4.0	7.10	28.40
	(RS1	2.5	2.45	6.13
	5456	2.0	2.40	4.80
	5457	2.0	25.20	50.40
	5458	1.0	1.70	1.70
	5459	2.0	9.25	18.50
	3578	1.0	4.20	4.20
	3592	1.0	0.90	0.90
	3576	1.0	8.70	8.70
	3577	7.0	1.80	12.60

Average width: 2.5'

Average grade: 14.00 oz. Ag/ton

Grade of Block B is weighted average of Blocks A & C = 8.40 oz. Ag/ton.

Grade of Block D is weighted average of Blocks A, B, C = 11.00 oz. Ag/ton.

Grade for Block E is the same as for Block D.

The calculated blocks are shown below:

BLOCK A was calculated as "Proved" ore above the 7328' level:

$$\frac{3.2' \times 400 \times 160.0}{10} = 2048 \text{ tons @ } 8.40 \text{ oz. Ag/ton}$$

BLOCK B was extended above "A" to surface, same width and grade was used and calculated as "Indicated" ore:

$$\frac{3.20' \times 140' \times 300}{10} = 1344 \text{ tons @ } 8.40 \text{ oz. Ag/ton}$$

BLOCK C was calculated as "Proved" ore between 7328' and 7200' levels:

$$\frac{2.5' \times 150' \times 255}{10} = 9562 \text{ tons @ } 14.00 \text{ oz. Ag/ton}$$

BLOCK D was calculated as "Indicated" ore below 7200' level:

$$\frac{3.0' \times 30' \times 320}{10} = 2840 \text{ tons @ } 11.00 \text{ oz. Ag/ton}$$

BLOCK E - "Inferred" ore taken below "D" gives:

$$\frac{3.0' \times 40' \times 320}{10} = 3840 \text{ tons @ } 11.00 \text{ oz. Ag/ton}$$

ORE RESERVES - cont.

Weighting all blocks gives an average assay width of 3.0 feet, and an average grade of 11.00 oz. Ag/ton.

Total tons, all categories = 19,674 tons @ 11.00 oz. Ag/ton.

Estimate of tons mined is as follows:

Workings	Waste Tons	Ore Tons
7200 x-cuts	2500	-
7200 Drift	-	1700
18 D Raise	-	160
#3 Raise	-	1270
#3 Sub Drift	-	170
7228 Drifts	-	840
7228 Raise above 7328 level		110
	2500	4250

Shipments are estimated at only 168 tons.
Ore remaining on dumps = 4,000 tons.
Ore remaining in mine = 15,000 tons @ 11.00 oz. Ag/ton

EXPLORATION PROGRAM

Diamond drilling should be carried out on surface to explore for extensions of the vein system northeast and southwest along strike and down-dip to intersect the veins below the lower adit. If the vein extension is located towards the southwest, the 7200' level crosscut could be extended eastward to intersect it and thus facilitate development of the southwest end of the mine.

Deeper drilling should be done to determine the continuity of the mineralization.

Underground diamond drilling from the 7200 ft. level is necessary to determine whether the quartz porphyry masses bordering the shear zones carry lead-zinc-silver in sufficient amounts to constitute ore. The known ore blocks may be mined from the present levels with a minimum of preparation. Upgrading broken ore appears possible by selective mining to a minimum width.

ESTIMATED COSTS FOR EXPLORATION PROGRAM

Diamond Drilling (Surface) 5000' @ $8/ft.....	$ 40,000
Diamond Drilling (Underground) 3000' @ $4/ft....	12,000
Drifting, 500' @ $40/ft.....	20,000
Raising, 500' @ $30/ft.....	15,000
Clean drifts, lay pipe & track, prepare drill stations	4,000
Bulldozing roads & showings	5,000
Engineering & Supervision	8,000
Assaying & Core boxes	3,500
Living Expenses & Travel	4,500
	$112,000

The above estimates are based on a six-month work program.

PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA E. P. SHEPPARD

E. Percy Sheppard

E. Percy Sheppard, P. Eng.
Consulting Geologist

February 22, 1969

C E R T I F I C A T E

I, E. PERCY SHEPPARD, of the City of Vancouver, in the PROVINCE OF BRITISH COLUMBIA, hereby certify THAT:

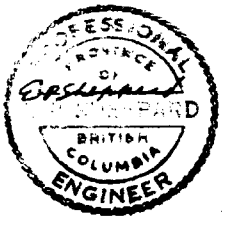
1. I am a Consulting Geologist with offices at 402 West Pender Street, Suite 314, Vancouver, B.C.;

2. I am a graduate of Dalhousie University, with a B.Sc. in Geology, and have been active in mining exploration and geophysics for over thirty years;

3. This report is based on my examination of the property during the period October 11 to 14, 1968; a study of pertinent data; and the detailed mapping and sampling being carried out by D. M. Basco, Resident Geologist;

4. I have no direct or indirect interest in the property or mining claim covered by this report, nor in the shares of Rio Resources Ltd. I do not expect to receive any direct or indirect interest as a result of writing this report;

5. I am a member of the Professional Engineers Association of British Columbia, the American Institute of Mining Engineers, the Society of Exploration Geophysicists, and a Fellow in the Geological Association of Canada.



DATED AT VANCOUVER, B. C., this 22nd day of February, 1969.

E. Percy Sheppard

E. Percy Sheppard, P. Eng.

RIO RESOURCES LTD (N.P.L.)
JASPER NATIONAL PARK
ROCKY MOUNTAIN FOREST
CLEARWATER FOREST
BANFF NATIONAL PARK
YOHO NATIONAL PARK
KOOTENAY NATIONAL PARK
WELLS GRAY PROVINCIAL PARK
MONASHEE MOUNTAINS
ALBERTA
B.C.
WASHINGTON
IDAHO
MONTANA
WASH.
IDAHO
MONT.
Edmonton
Calgary
Spokane
Drayton Valley
Red Deer
Rocky Mtn. House
Innisfail
Olds
Didsbury
Cochrane
Okotoks
High River
Nanton
Claresholm
Pincher
Banff
Canmore
Golden
Revelstoke
Valemount
Blue River
Clearwater Sta.
Kamloops
Salmon Arm
Enderby
Armstrong
Vernon
Kelowna
Penticton
Nakusp
New Denver
Sandon
Kaslo
Nelson
Castlegar
Trail
Creston
Cranbrook
Kimberley
Fernie
Grand Forks
Osoyoos
Invermere
Radium Hot Springs
Canal Flats
Fairmont Hot Sprs.
Bonners Ferry
Sandpoint
Coeur d'Alene
Kellogg
Wallace
Libby
Kalispell
Whitefish
Columbia Falls
Polson
Thompson Falls
Colville
Omak
Okanogan
Wenatchee
Chelan
Ephrata
Davenport
Cheney
Newport
Priest River
Northport
Tonasket
Republic
Eureka
Grasmere
Roosville
Yahk
Kingsgate
Eastport
Porthill
B.C.
VANCOUVER 745 Miles LETHBRIDGE ALTA
VANCOUVER 542 Miles LAKE LOUISE, ALTA
WATERTON LAKES NATIONAL PARK
GLACIER NATIONAL PARK

PLAN OF THE

R I O

MINERAL CLAIM

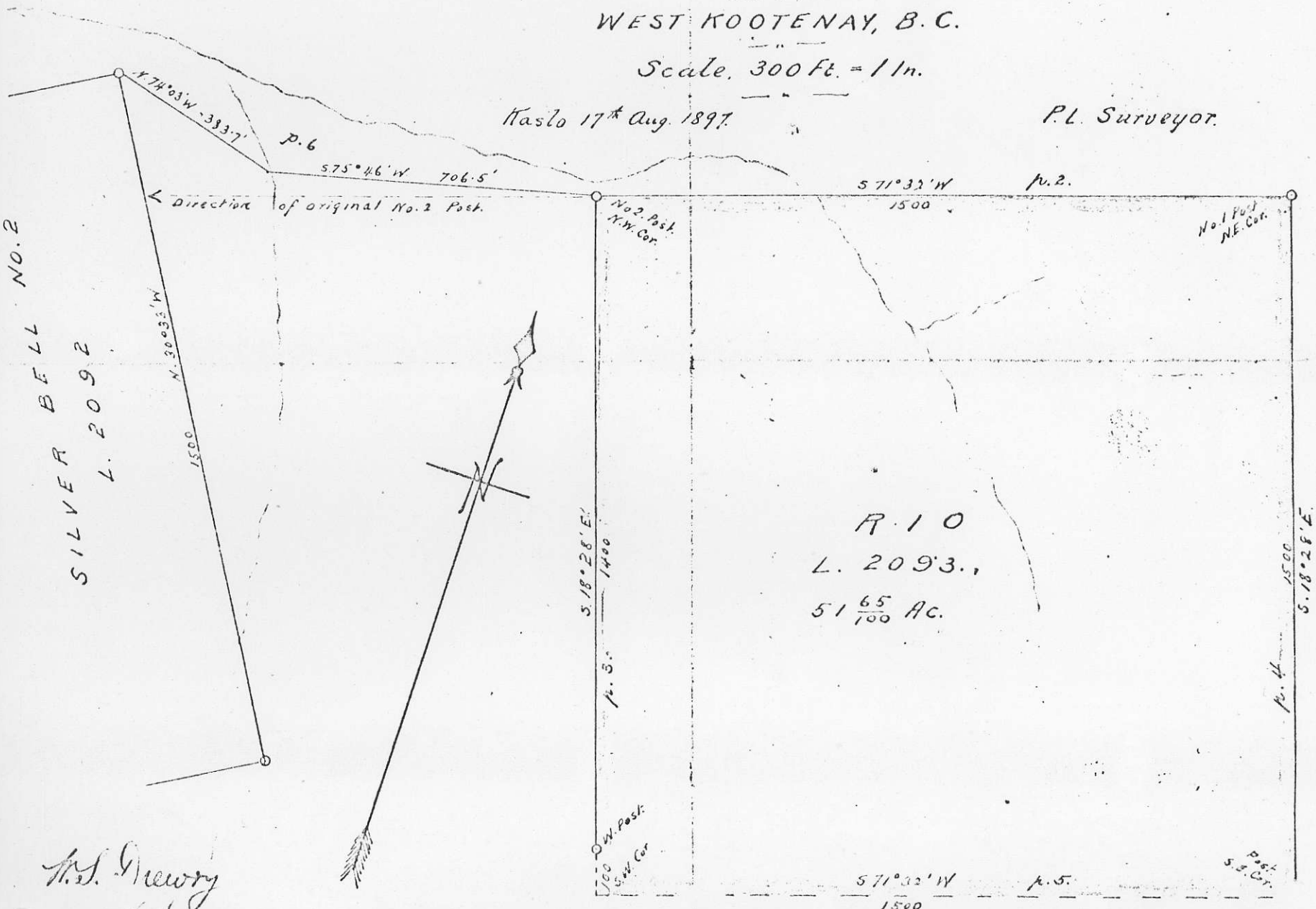
SLOCAN MINING DIVN

WEST KOOTENAY, B.C.

Scale. 300 Ft. = 1 In.

Kaslo 17th Aug. 1897.

P.L. Surveyor.



W.S. Drewry
P.L. Surveyor