ANNUAL REPORT

OF THE

MINISTER OF MINES

FOR THE

YEAR ENDED 31ST DECEMBER

1925

BEING AN ACCOUNT OF

MINING OPERATIONS FOR GOLD, COAL, ETC.

IN THE

PROVINCE OF BRITISH COLUMBIA.

PRINTED BY
AUTHORITY OF THE LEGISLATIVE ASSEMBLY.

VICTORIA, B.C.:
Printed by CHARLES F. BANFIELD, Printer to the King's Most Excellent Majesty.
1926.

To His Honour ROBERT RANDOLPH BRUCE,

Lieutenant-Governor of the Province of British Columbia.

MAY IT PLEASE YOUR HONOUR:

The Annual Report of the Provincial Mineralogist upon the Mining Industry of the Province for the year 1925 is herewith respectfully submitted.

WILLIAM SLOAN,

Minister of Mines.

Minister of Mines' Office,

February 2nd, 1926.



Consolidated Mining and Smelting Co. of Canada, Trail Smelter.

To the Honourable William Sloan,

Minister of Mines.

SIR,—I have the honour to submit herewith my Annual Report on the Mining Industry of the Province for the year ended December 31st, 1925.

The statistical tables give the total mineral production of the Province to date and show by Districts and Divisions the output of the various metals and minerals for the year 1925, and comparative figures for previous years.

The reports of the Resident Mining Engineers give much information about the progress of mining, development, and prospecting throughout the Province. The reports of the Inspectors of Mines cover fully coal-mining in British Columbia.

I have the honour to be,

Sir,

Your obedient servant,

JOHN D. GALLOWAY,

Provincial Mineralogist.

Bureau of Mines, Victoria, B.C.,

February 2nd, 1926.

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DEPARTMENT OF MINES.

VICTORIA, B.C.

HON. WILLIAM SLOAN - - - - - - *Minister of Mines.*
ROBERT DUNN - - - - - - - - - *Deputy Minister.*
JOHN D. GALLOWAY - - - - - - *Provincial Mineralogist.*
D. E. WHITTAKER - - - - - *Provincial Analyst and Assayer.*
GEORGE WILKINSON - - - - - - *Chief Inspector of Mines.*

HENRY DEVLIN, *District Inspector*, Nanaimo.
T. R. JACKSON, *District Inspector*, Nanaimo.
ROBERT STRACHAN, *District Inspector*, Fernie.
JOHN MACDONALD, *District Inspector*, Fernie.
JOHN G. BIGGS, *District Inspector*, Merritt.
THOS. J. SHENTON, *Dist. Inspector*, Prince Rupert.
H. H. JOHNSTONE, *Inspector*, Nelson.
J. DICKSON, *Inspector and Examiner*, Victoria.
H. E. MIARD, *Inspector and Examiner*, Fernie.

Resident Mining Engineers.

GEO. A. CLOTHIER, No. 1 District, Prince Rupert.
DOUGLAS LAY, No. 2 District, Hazelton.
H. G. NICHOLS, No. 3 District, Kamloops.
P. B. FREELAND, No. 4 District, Grand Forks.
A. G. LANGLEY, No. 5 District, Revelstoke.
W. M. BREWER, No. 6 District, Nanaimo.

GOLD COMMISSIONERS AND MINING RECORDERS.

Mining Division.	Location of Office.	Gold Commissioner.	Mining Recorder.	Sub-Recorder.
Atlin Mining Division	Atlin	C. L. Monroe	C. L. Monroe	Miss N. M. Mearing
Sub-office	Telegraph Creek			H. W. Dodd.
"	Haines (U.S.)		(Com. for taking Affidavits)	Risdon M. Odell.
"	Juneau (U.S.)		Ditto	Harold E. Brown.
Stikine Mining Division	Telegraph Creek	H. W. Dodd	H. W. Dodd	
Sub-office	Boundary	"	"	John Wynne.
Liard Mining Division	Telegraph Creek	"	"	
Sub-office	Porter			Chas. H. Smith.
"	McDame Creek			Mike Larsen.
"	Fort St. John			F. W. Beatton.
Skeena Mining Division	Prince Rupert	N. A. Watt	N. A. Watt	
Sub-office	Kitimat			G. L. Anderson.
"	Copper City			L. G. Skinner.
"	Terrace			L. H. Kenny.
"	Rosswood			Mrs. C. Warner.
"	Stewart (Portland Canal)			J. P. Scarlett.
Nass River	Anyox	N. A. Watt	R. M. McGusty	
Sub-office	Aiyansh	"		A. F. Priestly.
"	Alice Arm			Mrs. L. Cummings.
Portland Canal M.D.	Stewart	N. A. Watt (at Prince Rupert)	J. P. Scarlett	
Bella Coola Mining Div.	Prince Rupert	N. A. Watt	N. A. Watt	
Sub-office	Bella Coola			Brynild Brynildsen.
"	Bella Bella			
"	Ocean Falls			Geo. H. Hill.
Queen Charlotte Min'g D.	Queen Charlotte	N. A. Watt	John L. Barge	
Sub-office	Jedway			Isaac Thompson.
"	Masset			J. C. S. Dunn, M.D.
"	Lockeport			William Morgan.
Omineca Mining Division	Smithers	Stephen H. Hoskins	Jas. E. Kirby	
Sub-office	Fort Grahame			H. Ravenal.

GOLD COMMISSIONERS AND MINING RECORDERS—*Continued.*

Mining Division.	Location of Office.	Gold Commissioner.	Mining Recorder.	Sub-Recorder.
Omineca M.D.—*Con.*				
Sub-office	Finlay Forks			H. M. Gibson.
"	Fort St. James			Alex. C. Murray.
"	Manson Creek			W. B. Steele.
"	Telkwa			T. J. Thorp.
"	Prince George			Geo. Milburn. [ing).
"	Hudson Hope			J. L. Ruxton (Act-
"	Fort St. John			F. W. Beatton.
"	Copper City			L. G. Skinner.
"	Terrace			L. H. Kenny.
"	Fort Fraser			J. D. Moore.
"	Pacific			T. H. McCubbin.
"	Hazelton			Sperry Cline.
"	Burns Lake			L. Mulvaney.
"	Usk			Jas. L. Bethurem.
"	Tatla Landing			R. C. McCorkell.
Peace River Mining Div.	Fort St. John	S. H. Hoskins (at Smithers)	F. W. Beatton	
Sub-office	Prince George			G. Milburn.
"	Finlay Forks			H. M. Gibson.
"	Hudson Hope			J. L. Ruxton (Act-
"	Pouce Coupe			Fred. Fraser. [ing).
Cariboo Mining Division	Barkerville	H. Beech	H. Beech	Mrs. H. Beech.
Sub-office	Quesnel	"		E. C. Lunn.
"	Prince George	"		Geo. Milburn.
"	McBride	"		S. Service.
Quesnel Mining Division	Williams Lake	H. B. Campbell	H. B. Campbell	
Sub-office	Quesnel			E. C. Lunn.
"	Likely			A. B. Campbell.
"	Barkerville			H. Beech.
Clinton Mining Division	Clinton	R. J. A. Dorrell	R. J. A. Dorrell	
Sub-office	Williams Lake			H. B. Campbell.
Lillooet Mining Division	Lillooet [River	John Dunlop	John Dunlop	E. F. Little.
Sub-office	South Fork Bridge			W. Haylmore.
Kamloops Mining Division	Kamloops	E. Fisher	E. Fisher	L. J. Price.
Sub-office	Chu Chua			George Fennell.
"	Vavenby			A. McDonald.
"	Albas			C. O. Sjouquist.
Ashcroft Mining Division	Ashcroft	E. Fisher (at Kam.)	W. C. Adams	Miss F. H. C. Wilson
Sub-office	Lytton			W. Greenwood.
Nicola Mining Division	Merritt	E. Fisher (at Kam.)	W. H. Boothroyd	
Yale Mining Division	Yale	" "		
Sub-office	Hope	" "	D. A. Hazelton	Mrs. D. A. Hazel- [ton.
Similkameen Mining Div.	Princeton	Hugh Hunter	Hugh Hunter	
Sub-office	Hedley			R. E. Baxter.
Vernon Mining Division	Vernon	R. Ross Napier		
Greenwood Mining Div.	Greenwood	P. H. McCurrach	P. H. McCurrach	
Sub-office	Vernon			
"	Rock Creek			Owen Wheeler.
"	Beaverdell			C. D. Collen.
Grand Forks Min. Div.	Grand Forks	Chas. Mudge	Chas. Mudge	
Osoyoos Mining Division	Penticton	W. R. Dewdney	W. R. Dewdney	
Sub-office	Keremeos			L. H. Patten.
"	Hedley			R. E. Baxter.
"	Fairview			J. R. Brown.
Golden Mining Division	Golden	G. E. Sanborn	G. E. Sanborn	H. C. Moore.
Windermere Mining Div.	Wilmer	" (at Golden)	E. M. Sandilands	
Fort Steele Mining Div.	Cranbrook	J. Stewart (Acting)		
Sub-office	Fernie			E. T. Cope.
"	Yahk			W. A. Walker.
Ainsworth Mining Div.	Kaslo	Ronald Hewat	A. McQueen	A. W. Anderson.
Sub-office	Howser			W. Simpson.
"	Trout Lake			Roy V. Jacobson
"	Poplar			Arthur G. Johnston.

GOLD COMMISSIONERS AND MINING RECORDERS—*Continued.*

Mining Division.	Location of Office.	Gold Commissioner.	Mining Recorder.	Sub-Recorder.
Slocan Mining Division	New Denver	Ronald Hewat (at Kaslo)	Angus McInnes	
Sub-office	Sandon			W. J. Parham.
Slocan City Mining Div.	Slocan	Ronald Hewat	T. McNeish	
Trout Lake Mining Div.	Trout Lake	Ronald Hewat	Roy V. Jacobson	
Nelson Mining Division	Nelson	J. Cartmel	J. Cartmel	
Sub-office	Creston			H. W. McLaren.
"	Ymir			Wm. Clark.
"	Sheep Creek			Geo. Leece.
"	Salmo			M. C. Donaldson.
Arrow Lake Min. Division	Nakusp	J. Cartmel (at Nelson)	Walter Scott	
Sub-office	Vernon			
Revelstoke Mining Div.	Revelstoke	Wynfield Maxwell	C. J. Aman	
Lardeau Mining Division	Beaton	" (at Revelstoke)	Ernest Roberts	
Trail Creek Mining Div.	Rossland	W. H. Reid	W. H. Reid	
Nanaimo Mining Division	Nanaimo	L. A. Dodd	L. A. Dodd	
Sub-office	Ladysmith			J. A. Knight.
"	Alert Bay			Ernest H. Robinson
"	Vananda			Leonard Raper.
"	Granite Bay			Henry Twidle.
Alberni Mining Division	Alberni	A. G. Freeze	A. G. Freeze	
Clayoquot Mining Division	Clayoquot	" (at Alberni)	F. W. Towler (Act-	
Quatsino Mining Division	Quatsino	" "	Ed. Evensen. [ing.)	
Victoria Mining Division	Victoria	R. J. Steenson	R. J. Steenson	
New Westminster Min. D.	New Westminster.	F. C. Campbell	I. Wintemute	
Sub-office	Harrison Lake			L. A. Agassiz.
"	Chilliwack			Chas. J. Whittaker.
Vancouver Mining Div.	Vancouver	John Mahony	A. P. Grant	

OFFICE STATISTICS.

NORTH-WESTERN DISTRICT (No. 1).

ATLIN MINING DIVISION.

REPORT BY C. L. MONROE, GOLD COMMISSIONER, ATLIN.

I have the honour to submit the office statistics of the Atlin Mining Division for the year ended December 31st, 1925.

Free miners' certificates (individual)	291
Free miners' certificates (company)	3
Placer records	9
Placer rerecords	95
Leases applied for	18
Leases granted	18
Certificates of work (leases)	92
Leaves of absence	41
Bills of sale, etc. (placer)	6
Bills of sale, etc. (hydraulic)	27
Bills of sale, etc. (mineral)	59
Mineral records	142
Certificates of work (mineral)	98

Revenue.

Free miners' certificates	$1,727 50
Mining receipts, general	8,110 35
Total	$9,837 85

STIKINE AND LIARD MINING DIVISIONS.

REPORT BY H. W. DODD, GOLD COMMISSIONER, TELEGRAPH CREEK.

I have the honour to submit the office statistics of the Stikine and Liard Mining Divisions for the year ended December 31st, 1925.

Free miners' certificates (individual)	390
Free miners' certificates (company)	3
Placer claims recorded	115
Placer claims rerecorded	22
Mineral claims recorded	85
Certificates of work (mineral)	11
Placer leases issued	33
Certificates of work (placer leases)	36
Assignments and bills of sale	33
Powers of attorney and agreements	201
Leaves of absence (placer)	27
Filings	4

Revenue.

Free miners' certificates	$ 2,043 75
Mining receipts	8,440 60
Total	$10,484 35

SKEENA AND BELLA COOLA MINING DIVISIONS.

REPORT BY NORMAN A. WATT, GOLD COMMISSIONER, PRINCE RUPERT.

I have the honour to submit the office statistics of the Skeena and Bella Coola Mining Divisions for the year ended December 31st, 1925.

Free miners' certificates	304
Mining receipts	178
Mineral claims recorded	111
Certificates of work	188
Filings	27

Revenue.

Free miners' certificates	$1,565 00
Mining receipts	1,319 35
Total	$2,884 35

NASS RIVER MINING DIVISION.

REPORT BY R. M. MCGUSTY, MINING RECORDER, ANYOX.

I have the honour to submit the office statistics of the Nass River Mining Division for the year ended December 31st, 1925.

Free miners' certificates (individual)	237
Free miners' certificates (company)	4
Mineral claims recorded	307
Certificates of work (mineral)	375
Conveyances, etc.	62
Filings	23
Certificates of improvements recorded	16

Revenue.

Free miners' certificates	$1,419 50
Mining receipts	3,103 30
Total	$4,522 80

PORTLAND CANAL MINING DIVISION.

REPORT BY J. P. SCARLETT, MINING RECORDER, STEWART.

I have the honour to submit the office statistics of the Portland Canal Mining Division for the year ended December 31st, 1925.

Free miners' certificates (individual)	441
Free miners' certificates (company)	21
Mineral claims recorded	667
Certificates of work issued	924
Bills of sale, etc., recorded	271
Certificates of improvements recorded	44
Abandonments	5
Filings	90

Revenue.

Free miners' certificates	$ 4,482 50
Mining receipts	7,355 20
Total	$11,837 70

QUEEN CHARLOTTE MINING DIVISION.

REPORT BY JOHN L. BARGE, MINING RECORDER, QUEEN CHARLOTTE.

I have the honour to submit the office statistics of the Queen Charlotte Mining Division for the year ended December 31st, 1925.

Free miners' certificates	62
Mining claims recorded (quartz)	9
Placer claims recorded	1
Placer leases issued	6
Placer leases applied for	3
Certificates of work issued (quartz)	35
Certificates of work (placer leases)	6
Records entered	5
Records filed	2

Revenue.

Free miners' certificates	$271 75
Mining receipts	634 05
Total	$905 80

NORTH-EASTERN DISTRICT (No. 2).

CARIBOO MINING DIVISION.

REPORT BY H. BEECH, GOLD COMMISSIONER, BARKERVILLE.

I have the honour to submit the office statistics of the Cariboo Mining Division for the year ended December 31st, 1925.

Free miners' certificates issued	168
Mineral claims recorded	161
Placer claims recorded	4
Placer claims rerecorded	17
Certificates of work issued (leases)	165
Certificates of work issued (mineral)	105
Placer leases issued	43
Powers of attorney recorded	58
Conveyances and options recorded (leases)	39
Conveyances and options recorded (mineral)	17
Conveyances and options recorded (placer)	3

Revenue.

Mining receipts	$11,686 53
Free miners' certificates	1,337 45
Total	$13,023 98

QUESNEL MINING DIVISION.

REPORT BY H. B. CAMPBELL, GOLD COMMISSIONER, WILLIAMS LAKE.

I have the honour to submit the office statistics of the Quesnel Mining Division for the year ended December 31st, 1925.

Free miners' certificates issued (individual)	279
Free miners' certificates issued (special)	5
Mineral claims recorded	124
Certificates of work issued (mineral)	49

Placer-mining claims recorded and rerecorded	9
Applications for placer-mining leases	73
Placer-mining leases issued	113
Placer-mining leases in force	288
Certificates of work (placer)	173
Powers of attorney recorded	38
Conveyances and agreements recorded	73

Revenue.

Free miners' certificates	$ 1,441 25
Mining receipts, general	10,704 60
Total	$12,145 85

OMINECA MINING DIVISION.

REPORT BY S. H. HOSKINS, GOLD COMMISSIONER, SMITHERS.

I have the honour to submit the office statistics of the Omineca Mining Division for the year ended December 31st, 1925.

Free miners' certificates issued (ordinary)	741
Free miners' certificates issued (company)	7
Mineral claims recorded	370
Certificates of work recorded (mineral)	689
Certificates of work recorded (placer and hydraulic)	17
Placer claims recorded and rerecorded	15
Bills of sale and mining agreements, etc.	128
Powers of attorney recorded	77
Mining documents filed	51
Certificates of improvements recorded and issued	2
Applications for placer mining leases (Omineca)	26
Placer-mining leases issued (Omineca)	21

Revenue.

Free miners' certificates	$3,236 50
Mining receipts	5,838 60
Total	$9,075 10

CENTRAL DISTRICT (No. 3).

LILLOOET MINING DIVISION.

REPORT BY JOHN DUNLOP, GOLD COMMISSIONER, LILLOOET.

I have the honour to submit the office statistics of the Lillooet Mining Division for the year ended December 31st, 1925.

Free miners' certificates issued	170
Mineral claims recorded	90
Certificates of work recorded	188
Placer claims recorded and rerecorded	1
Placer-mining leases issued	13
Conveyances, etc., recorded	65

Revenue.

Free miners' certificates	$1,100 75
Mining receipts	2,840 15
Total	$3,940 90

CLINTON MINING DIVISION.

REPORT BY R. A. DORRELL, GOLD COMMISSIONER, CLINTON.

I have the honour to submit the office statistics of the Clinton Mining Division for the year ended December 31st, 1925.

Free miners' certificates	94
Mineral claims recorded	139
Certificates of work	98
Placer claims recorded	8
Bench leases issued	8
Bench leases in existence	9
Creek leases in existence	3
"Mineral Act," bills of sale, etc.	38
"Placer Act," bills of sale, etc.	13
Certificates of work (placer)	4
Notices to group	7
Filings	3
Certificates of improvements	1
Crown grants issued	1

Revenue.

Free miners' certificates	$ 436 75
Mining receipts, general	1,411 25
Total	$1,848 00

NICOLA MINING DIVISION.

REPORT BY W. H. BOOTHROYD, MINING RECORDER, MERRITT.

I have the honour to submit the office statistics of the Nicola Mining Division for the year ended December 31st, 1925.

Free miners' certificates	92
Mineral claims recorded	63
Certificates of work	71
Bills of sale	34
Powers of attorney	7
Revocation of powers of attorney	1

VERNON MINING DIVISION.

REPORT BY L. NORRIS, GOLD COMMISSIONER, VERNON.

I have the honour to submit the office statistics of the Vernon Mining Division for the year ended December 31st, 1925.

Free miners' certificates	288
Mineral records	117
Placer records	7
Placer leases	14
Certificates of work (mineral)	45
Conveyances (mineral)	22
Conveyances (placer leases)	18

YALE MINING DIVISION.

REPORT BY D. A. HAZELTON, MINING RECORDER, HOPE.

I have the honour to submit the office statistics of the Yale Mining Division for the year ended December 31st, 1925.

Free miners' certificates (ordinary)	224
Free miners' certificates (company)	5
Mineral claims recorded	158
Certificates of work (mineral)	155
Certificates of work (placer)	16
Placer leases in existence	25
Bills of sale (mineral)	19
Bills of sale (placer)	2
Powers of attorney (placer)	1
Filings	20

ASHCROFT MINING DIVISION.

REPORT BY W. C. ADAM, MINING RECORDER, ASHCROFT.

I have the honour to submit the office statistics of the Ashcroft Mining Division for the year ended December 31st, 1925.

Free miners' certificates	123
Mineral claims recorded	181
Certificates of work issued	65
Bills of sale recorded	12
Placer claims recorded	5
Certificates of work issued	6
Bills of sale and other records	15

KAMLOOPS MINING DIVISION.

REPORT BY E. FISHER, GOLD COMMISSIONER, KAMLOOPS.

I have the honour to submit the office statistics of the Kamloops Mining Division for the year ended December 31st, 1925.

Free miners' certificates (ordinary)	366
Mineral claims recorded	169
Mineral claims (partnership)	6
Placer claims recorded	3
Placer rerecords (partnership)	6
Placer leases issued	23
Certificates of work (mineral)	251
Certificates of work (placer leases)	14
Bills of sale	59
Powers of attorney	18
Certificates of improvements	16
Filings	52

Revenue.

Mining receipts	$5,522 40

SOUTHERN DISTRICT (No. 4).

GREENWOOD MINING DIVISION.

REPORT BY P. H. MCCURRACH, GOLD COMMISSIONER, GREENWOOD.

I have the honour to submit the office statistics of the Greenwood Mining Division for the year ended December 31st, 1925.

Free miners' certificates	206
Locations (quartz)	187
Locations (placer)	2
Certificates of work	121
Certificates of work (placer)	1
Leases of reverted Crown-granted mineral claims	28
Bills of sale	35
Agreements, etc.	6
Filings	28
Miscellaneous	8

GRAND FORKS MINING DIVISION.

REPORT BY CHAS. MUDGE, MINING RECORDER, GRAND FORKS.

I have the honour to submit the office statistics of the Grand Forks Mining Division for the year ended December 31st, 1925.

Free miners' certificates	74
Records of locations	22
Certificates of work	62
Bills of sale, etc.	13
Filings	5
Certificates of improvements	3
Crown grants	2
Leases of reverted mineral claims	16

OSOYOOS MINING DIVISION.

REPORT BY W. R. DEWDNEY, GOLD COMMISSIONER, PENTICTON.

I have the honour to submit the office statistics of the Osoyoos Mining Division for the year ended December 31st, 1925.

Locations (quartz)	61
Certificates of work	103
Transfers recorded	15
Agreements	1
Abandonments	1
Free miners' certificates issued	210
Filings	20

SIMILKAMEEN MINING DIVISION.

REPORT BY HUGH HUNTER, GOLD COMMISSIONER, PRINCETON.

I have the honour to submit the office statistics of the Similkameen Mining Division for the year ended December 31st, 1925.

Free miners' certificates	290
Location records (mineral claims)	191
Certificates of work (mineral claims)	96

Bills of sale (mineral claims)	42
Placer records	9
Placer leases	103
Certificates of work (placer leases)	53
Powers of attorney (placer leases)	53
Bills of sale (placer leases)	93

Revenue.

Mining receipts, general	$7,795 40

EASTERN DISTRICT (No. 5).

GOLDEN MINING DIVISION.

REPORT BY G. E. SANBORN, GOLD COMMISSIONER, GOLDEN.

I have the honour to submit the office statistics of the Golden Mining Division for the year ended December 31st, 1925.

Free miners' certificates (ordinary)	82
Free miners' certificates (special)	3
Mineral claims recorded	108
Placer claims recorded	1
Certificates of work (mineral)	47
Certificates of work (placer)	1
Bills of sale, agreements, etc.	58

Revenue.

Total receipts	$1,535 75

WINDERMERE MINING DIVISION.

REPORT BY E. M. SANDILANDS, MINING RECORDER, WILMER.

I have the honour to submit the office statistics of the Windermere Mining Division for the year ended December 31st, 1925.

Claims recorded (quartz)	97
Certificates of work issued	121
Free miners' certificates issued (ordinary)	130
Free miners' certificates issued (special)	2
Placer leases (bench and creek)	42
Bills of sale, bonds, agreements, etc.	34

FORT STEELE MINING DIVISION.

REPORT BY J. A. STEWART, ACTING GOLD COMMISSIONER, CRANBROOK.

I have the honour to submit the office statistics of the Fort Steele Mining Division for the year ended December 31st, 1925.

Free miners' certificates issued	391
Mineral claims recorded	497
Placer leases granted	12
Certificates of improvements	2
Bills of sale recorded (mineral and placer)	89
Leases of Crown-granted mineral claims	18
Crown grants issued	16
Certificates of work	289

Revenue.

Free miners' certificates	$2,052 50
Mining receipts, general	5,026 95
Total	$7,079 45

REVELSTOKE MINING DIVISION.

REPORT BY CHARLES AMAN, MINING RECORDER, REVELSTOKE.

I have the honour to submit the office statistics of the Revelstoke Mining Division for the year ended December 31st, 1925.

Free miners' certificates (ordinary)	239
Free miners' certificates (company)	1
Locations recorded	112
Certificates of work recorded	96
Leases of Crown-granted mineral claims	00
Placer claims recorded	4
Groupings recorded	1
Bills of sale, agreements, and powers of attorney	44

Revenue.

Free miners' certificates	$ 729 50
Mining receipts (sundry)	852 15
Leases of forfeited Crown-granted mineral claims issued	1,550 00
Crown grants to reverted claims	997 90
Creek leases	112 50
Total	$4,242 05

LARDEAU MINING DIVISION.

REPORT BY E. ROBERTS, MINING RECORDER, BEATON.

I have the honour to submit the office statistics of the Lardeau Mining Division for the year ended December 31st, 1925.

Free miners' certificates issued	68
Locations recorded	140
Certificates of work issued	85
Bills of sale	13
Notices to group	15
Lieu of work	2
Search	2
Powers of attorney	1

Revenue.

Free miners' certificates	$ 437 75
Mining receipts	814 85
Total	$1,252 60

AINSWORTH MINING DIVISION.

REPORT BY R. HEWAT, GOLD COMMISSIONER, KASLO.

I have the honour to submit the office statistics of the Ainsworth Mining Division for the year ended December 31st, 1925.

Free miners' certificates	113
Mineral claims recorded	100
Certificates of work recorded	340
Bills of sale, agreements, etc.	37
Leases of reverted Crown-granted mineral claims	45

SLOCAN MINING DIVISION.

REPORT BY ANGUS MCINNES, MINING RECORDER, NEW DENVER.

I have the honour to submit the office statistics of the Slocan Mining Division for the year ended December 31st, 1925.

Free miners' certificates issued	129
Claims recorded	30
Certificates of work recorded	99
Bills of sale recorded	5

Revenue.

Revenue from all sources	$4,696 05

SLOCAN CITY MINING DIVISION.

REPORT BY THOS. MCNEISH, MINING RECORDER, SLOCAN.

I have the honour to submit the office statistics of the Slocan City Mining Division for the year ended December 31st, 1925.

Free miners' certificates issued (company)	1
Free miners' certificates issued (ordinary)	43
Locations	27
Certificates of work issued	63
Bills of sale	3
Grouping notices	9

Revenue.

Revenue from all sources	$490 20

TROUT LAKE MINING DIVISION.

REPORT BY ROY JACOBSON, MINING RECORDER, TROUT LAKE.

I have the honour to submit the office statistics of the Trout Lake Mining Division for the year ended December 31st, 1925.

Free miners' certificates (individual)	56
Free miners' certificates (company)	1
Locations recorded	105
Certificates of work recorded	148
Rerecords of placer claims	2
Certificates of improvements	8
Grouping notices	29
Bills of sale	20
Agreements	1

Revenue.

Mining receipts	$ 635 50
Free miners' certificates	368 25
Total	$1,003 75

NELSON MINING DIVISION.

REPORT BY J. CARTMEL, GOLD COMMISSIONER, NELSON.

I have the honour to submit the office statistics of the Nelson Mining Division for the year ended December 31st, 1925.

Free miners' certificates (individual)	400
Free miners' certificates (company)	4
Free miners' certificates (special)	1
Claims recorded (mineral)	212
Claims rerecorded (placer)	1
Certificates of work issued	317
Agreements of sale, transfers, etc.	57
Grouping notices filed	17
Certificates of improvements issued	27
Leases of forfeited Crown-granted mineral claims issued	22

Revenue.

Free miners' certificates	$2,090 50
Mining receipts (general)	1,714 50
Mining receipts (lease fees, forfeited Crown-granted mineral claims)..	500 00
Mining receipts (lease fees, forfeited Crown-granted mineral claims)*	50 00
Total	$4,355 00

ARROW LAKE MINING DIVISION.

REPORT BY WALTER SCOTT, MINING RECORDER, NAKUSP.

I have the honour to submit the office statistics of the Arrow Lake Mining Division for the year ended December 31st, 1925.

Free miners' certificates	42
Certificates of work	6
Mineral claims recorded	20

TRAIL CREEK MINING DIVISION.

REPORT BY W. H. REID, GOLD COMMISSIONER, ROSSLAND.

I have the honour to submit the office statistics of the Trail Creek Mining Division for the year ended December 31st, 1925.

Free miners' certificates (individual)	112
Free miners' certificates (company)	4
Free miners' certificates (special)	1
Locations recorded	32
Certificates of work recorded	40
Assessments paid in lieu of work	2
Bills of sale	19
Notices to group	4
Leases of reverted Crown-granted claims	12

* Taken to account in Revelstoke office.

WESTERN DISTRICT (No. 6).

ALBERNI MINING DIVISION.

REPORT BY A. G. FREEZE, GOLD COMMISSIONER, ALBERNI.

I have the honour to submit the office statistics of the Alberni Mining Division for the year ended December 31st, 1925.

Mineral claims recorded	11
Certificates of work recorded	10
Free miners' certificates issued	32
Powers of attorney recorded	2
Placer leases issued	3

Revenue.

Free miners' certificates	$132 00
Mining receipts, general	333 00
Total	$465 00

CLAYOQUOT MINING DIVISION.

REPORT BY W. T. DAWLEY, MINING RECORDER, CLAYOQUOT.

I have the honour to submit the office statistics of the Clayoquot Mining Division for the year ended December 31st, 1925.

Mineral claims recorded	21
Certificates of work recorded	11
Free miners' certificates issued	19
Bills of sale recorded	8
Grouping notices, etc.	5

Revenue.

Free miners' certificates	$ 55 00
Mining receipts, general	197 50
Total	$252 50

QUATSINO MINING DIVISION.

REPORT BY ED. EVENSON, MINING RECORDER, QUATSINO.

I have the honour to submit the office statistics of the Quatsino Mining Division for the year ended December 31st, 1925.

Mineral claims recorded	17
Certificates of work	68
Bills of sale	6
Certificates of improvements	1
Notices of group on file	4
Free miners' certificates (ordinary)	31
Free miners' certificates (special)	2

Revenue.

Free miners' certificates	$171 75
Mining receipts, general	241 00
Total	$412 75

NANAIMO MINING DIVISION.

REPORT BY L. A. DODD, GOLD COMMISSIONER, NANAIMO.

Free miners' certificates issued	334
Mineral claims recorded	392
Certificates of work	404
Bills of sale, etc., recorded	61

Revenue.

Free miners' certificates	$ 910 25
Mining receipts, general	1,671 40
Total	$2,581 65

VICTORIA MINING DIVISION.

REPORT BY R. J. STEENSON, GOLD COMMISSIONER, VICTORIA.

I have the honour to submit the office statistics of the Victoria Mining Division for the year ended December 31st, 1925.

Free miners' certificates issued (individual)	311
Free miners' certificates issued (company)	36
Free miners' certificates issued (special)	2
Mineral claims recorded	19
Certificates of work recorded	35
Placer claims recorded	2
Placer claims rerecorded	1
Certificates of improvements issued	18
Reverted Crown-granted mineral claims (applications for Crown grants)	4
Grouping notices filed	1
Powers of attorney, etc., recorded	1

Revenue.

Free miners' certificates	$4,310 50
Mining receipts, general	545 32
Total	$4,855 82

VANCOUVER MINING DIVISION.

REPORT BY A. P. GRANT, MINING RECORDER, VANCOUVER.

I have the honour to submit the office statistics of the Vancouver Mining Division for the year ended December 31st, 1925.

Free miners' certificates issued	2,129
Free miners' certificates issued (company)	72
Free miners' certificates issued (special)	11
Claims recorded (quartz)	81
Certificates of work issued (quartz)	199
Receipts issued for money in lieu of work	1
Certificates recorded as work	2
Grouping notices and documents filed	29
Conveyances recorded	19
Certificates of improvements recorded	18

Revenue.

Free miners' certificates	$14,356 25
Mining receipts	947 20
Total	$15,303 45

NEW WESTMINSTER MINING DIVISION.

REPORT BY I. WINTEMUTE, MINING RECORDER, NEW WESTMINSTER.

I have the honour to submit the office statistics of the New Westminster Mining Division for the year ended December 31st, 1925.

Free miners' certificates issued	202
Mineral claims recorded	134
Placer claims recorded	1
Certificates of work issued	91
Conveyances, etc., recorded	23
Grouping notices filed	7
Placer leases	1

Revenue.

Free miners' certificates	$ 885 75
Mining receipts	831 75
Total	$1,717 50

BUREAU OF MINES.

REPORT BY JOHN D. GALLOWAY, PROVINCIAL MINERALOGIST.

The permanent staff of the Bureau of Mines consists of John D. Galloway, Provincial Mineralogist; D. E. Whittaker, Provincial Analyst and Provincial Assayer; J. B. Adams, Laboratory Assistant; H. T. Nation, general office assistant; and H. Pearson, clerk.

With increased activity in mining the work of the Bureau has increased considerably during recent years. The routine work of the office consists of supplying to the public much information regarding mining in the Province, directing prospectors to promising areas, supplying statistical information, interdepartmental reports, etc. The Annual Report of the Minister of Mines is compiled and edited by the staff. The Bureau also compiles much information regarding statistics, mining companies, etc., all of which is card-indexed. The Bureau of Mines co-operates fully with the six Resident Mining Engineers with regard to reports, assays, determinations of rocks and minerals, and many other matters.

From June to September, inclusive, the Provincial Mineralogist was Acting Resident Engineer of the Central Mineral Survey District. A number of special examinations were made during the year by the Provincial Mineralogist.

The facilities afforded by the Bureau to any one to obtain, free of charge, determinations of rock and mineral samples are being made more use of and in 1925 a very large number of such determinations were made.

It is interesting to note that a somewhat rare mineral was identified during the year by J. B. Adams, of the Bureau staff.

The sample was sent in by W. H. Smith, of Golden, who reported that he has a large deposit of the material on Moose creek, near Leanchoil, on the Canadian Pacific Railway. The mineral was determined as belonging to the perovskite group. Through the courtesy of Dr. Eugene Poitevin, Chief, Mineralogical Division, Mines Branch, Ottawa, a careful study of the mineral is being made by Dr. Ellsworth, of the Dominion Mines Branch.

The final report has not been received, but the following information about it has been received:—

"The mineral certainly belongs to the perovskite group, but it is not perovskite because it contains 3 per cent. of the cerium lanthanum earths. Titanium and lime are also present, indicating that the mineral is knopite—a mineral which up to this time has only been found in minute isolated crystals. This occurrence in the massive form is extremely interesting."

It is possible that the deposit, if large enough, might be worked as a source of titanium. It is expected that the occurrence will be examined by the Resident Engineer of the district during 1926.

GEOLOGICAL INFORMATION.

By an arrangement made at the time the Province of British Columbia entered Confederation, all geological investigations and mapping in the Province were to be carried on by the Geological Survey of Canada; this agreement has been fully adhered to by the Dominion Government and has proved of great benefit to the mining industry of the Province. Each year a number of geological parties are kept in the field and in the aggregate a vast amount of information is available to the prospector and the mining engineer in the many excellent reports and maps covering British Columbia which have been issued by the Geological Survey of Canada.

For some years a branch office of the Geological Survey has been maintained in Vancouver, where copies of maps and reports on British Columbia can be obtained. The officer in charge of this office is Dr. Victor Dolmage and the address is Winch Building, Vancouver, B.C.

ASSAY OFFICE.

REPORT BY D. E. WHITTAKER, PROVINCIAL ASSAYER.

During the year 1925 there were made by the staff in the Government Assay Office 5,895 assays or quantitative determinations; of these the majority were for the Bureau of Mines or for the other departments, for which no fees were received.

The fees collected by the office were as follows:—

Fees for analyses	$ 311 10
Fees for assaying	190 10
Fees for assayers' examinations	45 00
Total cash receipts	$ 546 20

Determinations and examinations made for other Government departments for which no fees were collected—

Attorney-General's Department	$ 504 00
Agricultural Department	724 00
Board of Health	580 00
Treasury Department	16 60
Other departments	130 00
	$1,954 60
Value of work done outside of Mines Department work	$2,500 80

The value of gold melted during the year 1925 was $478.80 in 10 lots, as against $1,073.50 in 8 lots in 1924.

FREE DETERMINATIONS.

In addition to the above quantitative work, a large number of qualitative determinations, or tests, were made in connection with the identification and classification of rocks or minerals sent to the Bureau for a report; of these no count was kept, nor were any fees charged, as it is the established custom of the Bureau to examine and test qualitatively, without charge, samples of minerals sent in from any part of the Province, and to give a report on the same. This has been done for the purpose of encouraging the search for new or rare minerals and ores, and to assist prospectors and others in the discovery of new mining districts, by enabling them to have determined, free of cost, the nature and probable value of any rock they may find. In making these free determinations, the Bureau asks that the locality from which the sample was obtained be given by the sender.

EXAMINATIONS FOR ASSAYERS.

REPORT BY D. E. WHITTAKER, SECRETARY OF BOARD OF EXAMINERS.

I have the honour, as Secretary, to submit the Annual Report for the year 1925 of the Board of Examiners for Certificates of Competency and Licence to Practise Assaying in British Columbia, as established under the "Bureau of Mines Act," R.S. 1924.

A meeting of the Board of Examiners was held on May 22nd and on November 11th, 1925. One candidate applied for examination on November 11th and passed the examination on that date. The Board recommended that a certificate be issued to him. One candidate applied for exemption under section 2, subsection (2), of the Act. The Board recommended that a certificate be issued to him.

In accordance with the recommendation of the Board certificates have been duly issued by the Honourable the Minister of Mines to the two candidates.

LIST OF ASSAYERS HOLDING PROVINCIAL CERTIFICATES OF EFFICIENCY UNDER THE "BUREAU OF MINES ACT," R.S. 1924.

(Only the holders of such certificates may practise assaying in British Columbia.)

Under section 2, subsection (1).

Adams, J. B.	Victoria.
Archer, E. G.	Anyox.
Armstrong, N.	Vancouver.
Ayres, D. A.	
Austin, John W.	Vancouver.
Backus, Geo. S.	Britannia Beach.
Baker, C. S. H.	
Bajus, N. J.	Vancouver.
Barke, A. C.	
Beilby, E. B.	Vancouver.
Bernard, Pierre	Monte Christo, Wash.
Bishop, Walter	
Boulding, J. D.	Vancouver.
Broughton, F. W.	Vancouver.
Buchanan, James	Trail.
Buehman, A. S.	Trail.

Under section 2, subsection (1)—Continued.

Campbell, Colin	New Denver.
Carmichael, Norman	New York.
Church, George B.	
Clarke, E. R.	Vancouver.
Cobeldick, W. M.	Scotland.
Collison, H.	Cobham, England.
Comrie, George H.	Vancouver.
Cotton, G. W.	Trail.
Craufurd, A. J. F.	Rossland.
Crerar, George	
Crompton, S. V.	Vancouver.
Cruickshank, G.	
Davidson, J. R.	Vancouver.
Day, Athelstan	Dawson.
Dedolph, Ed.	
Dockrill, Walter R.	Chemainus.
Dunn, G. W.	Rossland.
Farquhar, J. B.	Vancouver.
Fingland, John J.	Kaslo.
Gardner, C. S.	Victoria.
Grosvenor, F. E.	Vancouver.
Hamilton, Wm. J.	Anyox.
Hannay, W. H.	Trail.
Harsant, R. C. C.	
Hart, P. E.	
Hawkins, Francis	Lake Hill.
Hawes, F. B.	Vancouver.
Hodgson, A. R.	Anyox.
Hurter, C. S.	Prince Rupert.
Irwin, George E.	Vancouver.
John, D.	Haileybury, Ont.
Kiddie, Geo. R.	California.
King, R.	
Kitto, Geoffrey B.	Victoria.
Lang, T. F.	Vancouver.
Langley, A. G.	Revelstoke.
Laucks, I. F.	Seattle.
Lee, Fred E.	Trail.
Lee, Geo. M.	
Ley, Richard H.	Victoria.
Levy, Frank	
Lindsay, W. W.	Kimberley.
Locke, V. F.	Vancouver.
Longworth, F. J.	Boyds, Wash.
Manning, S. M.	Trail.
Martin, S. J.	
Marsh, Richard	Republic, Wash.
Marshall, H. Jukes	Vancouver.
Marshall, William S.	Ladysmith.
Meale, Eric A.	East Helena, Mont.
Merrifield, T. T.	Trail.
Miles, Arthur D.	
Milne, A. S.	Vancouver.
Mitchell, Charles T.	Copper Cliff, Ont.
McCormick, Alan F.	Ruth, Nevada.
MacDonald, Alec C.	Vancouver.
MacDonald, J. S.	Vancouver.
McIntosh, J. H.	Bamberton.
McLellan, R. D.	Vancouver.
Morgan, Richard	Trail.
Nicholls, Frank	Norway.
Okell, S. E.	Vancouver.
Parker, Robt. H.	
Parsenow, W. L.	
Perkins, Walter G.	
Pickard, T. D.	Vancouver.
Pirrie, Noble W.	Victoria.
Poole, H. W.	Vancouver.
Prior, C. E.	Hedley.
Puder, H. F. H.	Vancouver.
Raht, K.	Trail.
Richmond, Leigh	Duncan.
Robertson, T. R.	Vancouver.
Rodgers, Ch. B.	
Rogers, G. J.	South Vancouver.
Rombauer, A. B.	Butte, Mont.
Schroeder, Curt A.	
Segsworth, Walter	Toronto, Ont.
Shepherd, G. H.	North Vancouver.
Sharpe, Bert N.	
Shore, J. T.	Vancouver.
Sim, Chas. John	Monte Carlo.
Sloan, Wm.	Vancouver.
Snyder, Blanchard M.	
Steven, Wm. Gordon	
Stimmel, B. A.	Trail.
Stockly, Galt	Princeton.
Sundberg, Gustave	Mexico City.
Tally, Robert E.	Spokane, Wash.
Taylor, E. S.	Vancouver.
Taylor, H. L.	Vancouver.
Teed, A. J.	Vancouver.
Thirkell, V. R.	Vancouver.
Thomas, Percival W.	Vancouver.
Tretheway, John H.	
Turner, H. A.	Vancouver.
Vance, John F. C. B.	Vancouver.
Van Agnew, Frank	Siberia.
Vaughan-Williams, V. L.	California.
Wales, Roland T.	
Watson, Wm. J.	Ladysmith.
Watson, Thomas	Vancouver.
Welsh, J. Cuthbert	Butte, Mont.
Wells, Ben T.	
West, Geo. G.	Vancouver.
Wenerstrom, L. H.	Anyox.
Whittaker, Delbert E.	Victoria.
Widdowson, E. Walter	Nelson.
Willemar, Douglas R.	Masset.
Williams, W. A.	Vancouver.
Williams, Eliot H.	
Williams, J. R.	Vancouver.
Wimberley, S. H.	Nevada, U.S.A.
Youngs, T. N.	Victoria.

Under section 2, subsection (2).

Archer, Allan	
Blaylock, Selwyn G.	Trail.
Bissett, D. G.	Trail.
Bolton, George E.	Silverton.
Brennan, Charles Victor	Britannia Beach.
Browne, R. J.	Rossland.
Browne, P. J.	Nelson.
Bryant, Cecil M.	Victoria.
Burwash, N. A.	
Cavers, Thomas W.	
Clothier, George A.	Prince Rupert.
Cole, Arthur A.	Cobalt, Ont.
Cole, G. E.	Rossland.
Cole, L. Heber	Ottawa, Ont.
Conway, E. J.	Vancouver.
Coo, Cecil William	Toronto, Ont.
Coulthard, R. W.	
Cowans, Frederick	

Under section 2, subsection (2)—Continued.

Dawson, V. E.	Trail.
Dempster, R. C.	Rossland.
Dempster, A. S.	Rossland.
Dixon, Howard A.	Toronto, Ont.
Eardley-Wilmot, V. L.	Ottawa.
Pellew-Harvey, Wm.	Vancouver.
Fotheringham, D. F.	Trail.
Galbraith, M. T.	
Gilman, Ellis P.	Vancouver.
Gray, Stanley	
Green, J. T. Raoul	Blairmore, Alta.
Guess, George A.	Toronto, Ont.
Harding, Wilson M.	
Heal, John H.	
Hearn, Roy D.	Trail.
Hilliary, G. M.	Idaho, U.S.A.
Johnston, William Steele	Lachine, Que.
Kaye, Alexander	Vancouver.
Kendall, George	Vancouver.
Kidd, G. L.	Edmonton, Alta.
Kilbourne, Geo. H.	Victoria.
Lathe, Frank E.	Montreal.
Lay, Douglas	Hazelton.
Lewis, Francis B.	South Africa.
Mellish, Albert Henry	Premier.
Merrit, Charles P.	
Murphy, C. J.	St. Catharines, Ont.
Musgrave, W. N.	England.
McArthur, Reginald E.	
McBean, K. D.	Trail.
McDiarmid, S. S.	
McGinnis, Wm. C.	Queen Charlotte Ilds.
McKay, Robt. B.	Vancouver.
McLellan, John	Skidegate.
McMurtry, Gordon O.	
McNab, J. A.	Thompson, Nevada.
McPhee, W. B.	
McVicar, John	Edmonton, Alta.
Maclennan, F. W.	
Moran, P. J.	Vancouver.
Newton, W. E.	Sandon.
Oliver, Chas. E.	Vancouver.
Oughtred, S. W.	Ainsworth.
Outhett, Christopher	Kamloops.
Pemberton, W. P. D.	Victoria.
Reid, J. A.	Cobalt, Ont.
Ritchie, A. B.	Nelson.
Roaf, J. R.	
Roscoe, Harold M.	Anyox.
Rose, J. H.	Thompson, Nevada.
Rutherford, R. C.	Trail.
Sampson, E. H. S.	Riondel.
Scott, John Mitchell	Stewart.
Scott, Oswald Norman	
Shannon, S.	
Sharpe, G. P.	Midland, Ont.
Shorey, P. M.	Trail.
Sloan, David	Three Forks.
Stevens, F. G.	Mexico.
Stewart, A. G.	Vancouver.
Stroud, J. E. C.	Anyox.
Sullivan, Michael H.	Kellogg, Idaho.
Sutherland, T. Fraser	
Sutherland, Wm.	Glasgow, Scotland.
Swinney, Leslie A. E.	
Thompson, W. K.	Trail.
Thomson, H. Nellis	Anaconda, Mont.
Watson, A. A.	
Watson, Henry	
Weir, William	Anyox.
White, E. Grove	Stewart.
Willis, F. S.	Trail.
Winslow, R. H.	Vancouver.
Wilson, Ridgeway R.	Victoria.
Workman, Ch. W.	
Wright, Richard	Rossland.
Wynne, Llewellyn C.	
Yuill, H. H.	

Under section 2, subsection (3).

Carmichael, Herbert	Victoria.
Galloway, J. D. (Provincial Mineralogist.)	Victoria.
Harris, Henry	Tasmania.
Hedley, Robt. R.	Vancouver.
Kiddie, Thos.	California.
Marshall, Dr. T. R.	London, England.
McKillop, Alexander	Vancouver.
Pellew-Harvey, Wm.	London, England.
Robertson, Wm. Fleet (Provincial Mineralogist.) (Retired Feb., 1925.)	Victoria.

PREVIOUSLY ISSUED UNDER THE "BUREAU OF MINES ACT, 1897," SECTION 12.

Thompson, James B.	Vancouver.

MINERAL PRODUCTION OF BRITISH COLUMBIA.

METHOD OF COMPUTING PRODUCTION.

The total mineral production of the Province consists of the outputs of metals, coal and coke, building materials, and miscellaneous minerals, valued at standard recognized prices.

In this Annual Report some changes have been made in the methods used in previous years in computing and valuing the products of the industry; but in order to facilitate comparisons with former years the same general style of tables has been adhered to.

The following notes explain the methods used:—

(1.) From the certified returns of lode mines of ore and concentrate shipments made during the full calendar year by the producers the net recovered metal contents have been determined by deducting from the "assay value content" necessary corrections for smelting and refining losses.

In making comparisons of production figures with previous years, it should be remembered that prior to 1925 in the Annual Reports the total metal production, with the exception of copper, was determined by taking the assay value content of all ores shipped; deductions for slag losses were made by taking varying percentages off the metal prices. Apparent small decreases of production in some Divisions in 1925 as compared with 1924 have therefore been caused by the different methods of computation.

(2.) Gold-placer returns are received from the operators in dollars and the dollar value converted to ounces of placer gold at $17 an ounce, which is believed to represent the average value of placer gold throughout the Province.

(3.) The prices used in valuing the different metals are: For gold, the world standard price of $20.6718 an ounce; for silver, the average New York metal-market price for the year; for lead, the average London metal-market price for the year; for zinc, the average London metal-market price for the year; and for copper, the average New York metal-market price for the year. The silver and copper outputs of the Province are bought and sold on the basis of the New York metal-market prices of these metals and for this reason they are used. The bulk of the lead and zinc production of the Province is sold on the basis of the London prices of these metals and they are therefore used. The New York and Montreal lead- and zinc-market prices differ materially from the London prices of these metals and are not properly applicable to valuing the British Columbia production.

(4.) The production figures of coal and coke are collected from the operators by the Inspection Branch. Arbitrary prices of $5 a long ton for coal and $7 a long ton for coke are used in valuing the outputs. It is believed that these figures represent the approximate average selling-prices of coal and coke by the operators.

(5.) Building materials are valued at the prices given by the producers.

(6.) Miscellaneous minerals are valued at the prices given by the producers.

STATISTICAL TABLES.

TABLE I.—TOTAL PRODUCTION FOR ALL YEARS UP TO AND INCLUDING 1925.

Gold, placer	$ 77,663,045
Gold, lode	122,808,459
Silver	74,111,397
Copper	197,642,647
Lead	89,218,907
Zinc	39,925,947
Coal and coke	273,048,953
Building-stone, bricks, etc.	44,905,886
Miscellaneous minerals, etc.	1,594,387
Total	$920,919,628

TABLE II.—PRODUCTION FOR EACH YEAR FROM 1852 TO 1925 (INCLUSIVE).

1852 to 1895 (inclusive)	$ 94,547,241	1911	$ 23,499,072
1896	7,507,956	1912	32,440,800
1897	10,455,268	1913	30,296,398
1898	10,906,861	1914	26,388,825
1899	12,393,131	1915	29,447,508
1900	16,344,751	1916	42,290,462
1901	20,086,780	1917	37,010,392
1902	17,486,550	1918	41,782,474
1903	17,495,954	1919	33,296,313
1904	18,977,359	1920	35,543,084
1905	22,461,325	1921	28,066,641
1906	24,980,546	1922	35,158,843
1907	25,882,560	1923	41,304,320
1908	23,851,277	1924	48,704,604
1909	24,443,025	1925	61,492,242
1910	26,377,066		
		Total	$920,919,628

Table III. gives a statement in detail of the quantities and value of the different mineral products for the years 1923, 1924, and 1925.

TABLE III.—QUANTITIES AND VALUE OF MINERAL PRODUCTS FOR 1923, 1924, AND 1925.

	Customary Measure.	1923.		1924.		1925.	
		Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
Gold, placer*	Ounces	20,320	$ 420,000	21,037	$ 420,750	* 16,476	$ 280,092
" lode	"	179,245	3,704,994	247,716	5,120,535	209,719	4,335,269
Silver	"	6,032,986	3,718,129	8,341,768	5,292,184	7,654,844	5,286,818
Copper	Pounds	57,720,290	8,323,266	64,845,393	8,442,870	72,306,432	10,153,269
Lead	"	96,663,152	6,321,770	170,384,481	12,415,917	237,899,199	18,670,329
Zinc	"	58,343,462	3,278,903	79,130,970	4,266,741	98,257,099	7,754,450
Coal	Tons, 2,240 lb.	2,453,223	12,266,115	1,939,526	9,697,630	2,328,522	11,642,610
Coke	" "	58,919	412,433	30,615	214,305	75,185	526,295
Building materials and miscellaneous minerals			2,858,710		2,833,672		2,843,110
Totals			$41,304,320		$48,704,604		$ 61,492,242

* Placer gold in 1925 valued at $17 an ounce; in former years at $20.

TABLE IV.—OUTPUT OF MINERAL PRODUCTS BY DISTRICTS AND DIVISIONS.

Names.	Divisions.			Districts.		
	1923.	1924.	1925.	1923.	1924.	1925.
North-western District (No. 1)				$10,369,235	$11,012,170	$11,116,434
Atlin, Stikine, and Liard	$ 157,874	$ 153,122	$ 98,365			
Nass River	5,240,085	5,024,242	5,977,875			
Portland Canal	4,121,213	4,952,955	4,170,310			
Skeena, Queen Charlotte, and Bella Coola	850,063	881,851	869,984			
North-eastern District (No. 2)				281,575	486,078	321,876
Cariboo and Quesnel	270,575	240,000	207,538			
Omineca and Peace River	11,000	246,078	114,338			
Central District (No. 3)				555,131	355,664	333,063
Nicola and Vernon	405,603	332,693	230,281			
Yale, Ashcroft, and Kamloops	140,496	9,386	17,235			
Lillooet and Clinton	9,032	13,585	85,547			
Southern District (No. 4)				1,180,042	1,554,671	2,062,183
Grand Forks, Greenwood, and Osoyoos	437,657	748,486	893,985			
Similkameen	742,385	806,185	1,168,198			
Eastern District (No. 5)				14,957,437	21,952,774	33,982,941
Fort Steele	12,915,722	18,757,222	31,510,755			
Windermere and Golden	102,092	127,538	86,369			
Ainsworth	174,900	211,566	392,968			
Slocan and Slocan City	1,526.194	1,270,153	1,345,269			
Nelson and Arrow Lake	27,035	47,567	118,992			
Trail Creek	189,439	1,510,122	524,215			
Revelstoke, Trout Lake, and Lardeau	22,055	28,606	4,373			
Western District (No. 6)				13,960,900	13,343,247	13,675,745
Nanaimo, Alberni, Clayoquot, Quatsino, and Victoria (Vancouver Island)	9,944,678	9,428,015	8,832,823			
Vancouver and New Westminster (Mainland)	4,016,222	3,915,232	4,842,922			
Totals				$41,304,320	$48,704,604	$61,492,242

TABLE V.—PLACER GOLD.

Table V. contains the yearly production of placer gold to date, as determined by returns sent in by the Gold Commissioners and Resident Engineers. To these yearly amounts one-third was added up to the year 1878; from then to 1895 and from 1898 to 1909, one-fifth; and since then one-tenth, which proportions are considered to represent, approximately, the amount of gold sold of which there is no record. This placer gold contains from 10 to 25 per cent. silver, but the silver value has not been separated from the totals, as it would be insignificant.

YIELD OF PLACER GOLD TO DATE.

1858	$ 705,000	1875	$2,474,004	1892	$ 399,526	1909	$ 477,000
1859	1,615,070	1876	1,786,648	1893	356,131	1910	540,000
1860	2,228,543	1877	1,608,182	1894	405,516	1911	426,000
1861	2,666,118	1878	1,275,204	1895	481,683	1912	555,500
1862	2,656,903	1879	1,290,058	1896	544,026	1913	510,000
1863	3,913,563	1880	1,013,827	1897	513,520	1914	565,000
1864	3,735,850	1881	1,046,737	1898	643,346	1915	770,000
1865	3,491,205	1882	954,085	1899	1,344,900	1916	580,500
1866	2,662,106	1883	794,252	1900	1,278,724	1917	496,000
1867	2,480,868	1884	736,165	1901	970,100	1918	320,000
1868	3,372,972	1885	713,738	1902	1,073,140	1919	286,500
1869	1,774,978	1886	903,651	1903	1,060,420	1920	221,600
1870	1,336,956	1887	693,709	1904	1,115,300	1921	233,200
1871	1,799,440	1888	616,731	1905	969,300	1922	364,800
1872	1,610,972	1889	588,923	1906	948,400	1923	420,000
1873	1,305,749	1890	490,435	1907	828,000	1924	420,750
1874	1,844,618	1891	429,811	1908	647,000	1925	280,092
						Total	$77,663,045

TABLE VI.—PRODUCTION OF LODE MINES.

YEAR.	GOLD.		SILVER.		COPPER.		LEAD.		ZINC.		TOTAL VALUE.
	Oz.	Value.	Oz.	Value.	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	
		$		$		$		$		$	$
1887	.....	.....	17,690	17,331	.....	.....	204,800	9,216	.....	.....	26,547
1888	.....	.....	79,780	75,000	.....	.....	674,500	29,813	.....	.....	104,813
1889	.....	.....	53,192	47,873	.....	.....	165,100	6,498	.....	.....	54,371
1890	.....	.....	70,427	73,948	.....	.....	*Nil.*	*Nil.*	.....	.....	73,948
1891	.....	.....	4,500	4,000	.....	.....	*Nil.*	*Nil.*	.....	.....	4,000
1892	.....	.....	77,160	66,935	.....	.....	808,420	33,064	.....	.....	99,999
1893	1,170	23,404	227,000	195,000	.....	.....	2,135,023	78,996	.....	.....	297,400
1894	6,252	125,044	746,379	470,219	324,680	16,234	5,662,523	169,875	.....	.....	781,342
1895	39,264	785,271	1,496,522	977,229	952,840	47,642	16,475,464	532,255	.....	.....	2,342,397
1896	62,259	1,244,180	3,135,343	2,100,689	3,818,556	190,926	24,190,977	721,884	.....	.....	4,257,179
1897	106,141	2,122,820	5,472,971	3,272,836	5,325,180	266,258	38,841,135	1,390,517	.....	.....	7,052,431
1898	110,061	2,201,217	4,292,401	2,375,841	7,271,678	874,781	31,693,559	1,077,581	.....	.....	6,529,420
1899	138,315	2,857,573	2,939,413	1,663,708	7,722,591	1,351,453	21,862,436	878,870	.....	.....	6,751,604
1900	167,153	3,453,381	3,958,175	2,309,200	9,997,080	1,615,289	63,358,621	2,691,887	.....	.....	10,069,757
1901	210,384	4,348,603	5,151,333	2,884,745	27,603,746	4,446,963	51,582,906	2,002,733	.....	.....	13,683,044
1902	236,491	4,888,289	3,917,917	1,941,328	29,636,057	3,446,673	22,536,381	824,832	.....	.....	11,101,102
1903	232,831	4,812,616	2,996,204	1,521,472	34,359,921	4,547,535	18,089,283	689,744	.....	.....	11,571,367
1904	222,042	4,589,608	3,222,481	1,719,516	35,710,128	4,578,037	36,646,244	1,421,874	.....	.....	12,309,035
1905	238,660	4,933,102	3,439,417	1,971,818	37,692,251	5,876,222	56,580,703	2,399,022	.....	.....	15,180,164
1906	224,027	4,630,639	2,990,262	1,897,320	42,990,488	8,288,565	52,408,217	2,667,578	.....	.....	17,484,102
1907	196,179	4,055,020	2,745,448	1,703,825	40,832,720	8,166,544	47,738,703	2,291,458	.....	.....	16,216,847
1908	255,582	5,282,880	2,631,389	1,321,483	47,274,614	6,240,249	43,195,733	1,632,799	.....	.....	14,477,411
1909	238,224	4,924,090	2,532,742	1,239,270	45,597,245	5,918,522	44,396,346	1,709,259	8,500,000	400,000	14,191,141
1910	267,701	5,533,380	2,450,241	1,245,016	38,243,934	4,871,512	34,658,746	1,386,350	4,184,192	192,473	13,228,731
1911	228,617	4,725,513	1,892,364	958,293	36,927,656	4,571,644	26,872,397	1,069,521	2,634,544	129,092	11,454,063
1912	257,496	5,322,442	3,132,108	1,810,045	51,456,587	8,408,513	44,371,454	1,805,627	5,358,280	316,139	17,662,766
1913	272,254	5,627,490	3,465,856	1,968,606	46,460,305	7,094,489	55,364,677	2,175,232	6,758,768	324,421	17,190,838
1914	247,170	5,109,004	3,602,180	1,876,736	45,009,699	6,121,319	50,625,048	1,771,877	7,866,467	346,125	15,225,061
1915	250,021	5,167,934	3,366,506	1,588,991	56,918,405	9,835,500	46,503,590	1,939,200	12,982,440	1,460,524	19,992,149
1916	221,932	4,587,334	3,301,923	2,059,739	65,379,364	17,784,494	48,727,516	3,007,462	37,168,980	4,043,985	31,483,014
1917	114,523	2,367,190	2,929,216	2,265,749	59,007,565	16,038,256	37,307,465	2,951,020	41,848,513	3,166,259	26,788,474
1918	164,674	3,403,812	3,498,172	3,215,870	61,483,754	15,143,449	43,899,661	2,928,107	41,772,916	2,899,040	27,590,278
1919	152,426	3,150,645	3,403,119	3,592,673	42,459,339	7,939,896	29,475,968	1,526,855	56,737,651	3,540,429	19,750,498
1920	120,048	2,481,392	3,377,849	3,235,980	44,887,676	7,832,899	39,331,218	2,816,116	47,208,268	3,077,979	19,444,365
1921	135,663	2,804,154	2,673,389	1,591,201	39,036,993	4,879,624	41,402,288	1,693,354	49,419,372	1,952,065	12,920,398
1922	197,856	4,089,684	7,101,311	4,554,781	32,359,896	4,329,754	67,447,985	3,480,316	57,146,548	2,777,322	19,231,857
1923	179,245	3,704,994	6,032,986	3,718,129	57,720,290	8,323,266	96,663,152	6,321,770	58,343,462	3,278,903	25,347,062
1924	247,716	5,120,535	8,341,768	5,292,184	64,845,393	8,442,870	170,384,481	12,415,917	79,130,970	4,266,741	35,538,247
1925	209,719	4,335,269	7,654,844	5,286,818	72,306,432	10,153,269	237,899,199	18,670,329	98,257,099	7,754,450	46,200,135
To'l	5,952,087	122,808,459	118,421 978	74,111,397	1191 612013	197,642,647	1,650,690,919	89,218,907	615,318,470	39,925,947	523,707,357

TABLE VII.—PRODUCTION IN DETAIL OF THE

DISTRICTS AND DIVISIONS.	YEAR	TONS.	GOLD—PLACER.★		GOLD—LODE.		SILVER.	
			Ounces	Value.	Ounces.	Value.	Ounces.	Value.
				$		$		$
North-western District (No. 1)								
Atlin	1924	30	8,647	147,000	5	103	2,250	1,427
	1925	1,710	2,896	49,229	1,873	38,822	2,786	1,924
Stikine	1924							
	1925		41	700				
Liard	1924		196	3,325				
	1925		441	7,500				
Nass River	1924	1,023,562			6,323	130,696	429,186	272,284
	1925	1,168,696			7,484	154,708	390,954	270,012
Portland Canal	1924	187,162			139,462	2,882,680	3,053,562	1,937,241
	1925	168,798			118,469	2,448,967	2,392,046	1,652,066
Skeena	1924	86,514			34,673	716,691	15,781	10,012
	1925	78,640			35,086	725,291	21,273	14,692
Queen Charlotte	1924							
	1925		4	70				
Bella Coola	1924							
	1925							
North-eastern District (No. 2)								
Cariboo	1924		3,530	60,000				
	1925		8,919	151,627				
Quesnel	1924		10,588	180,000				
	1925		2,995	50,911				
Omineca	1924	1,709	294	5,000	329	6,800	262,759	166,700
	1925	842	269	4,560	121	2,501	85,888	59,319
Peace River	1924		294	5,000				
	1925		177	3,000				
Central District (No. 3)								
Nicola	1924	5			2	41	64	41
	1925	83					59	41
Vernon	1924							
	1925		4	80				
Yale	1924	1	59	1,000	9	186		
	1925	1	29	500	37	765		
Ashcroft	1924	1	29	500	2	41		
	1925							
Kamloops	1924	34	29	500	125	2,584	24	15
	1925		78	1,320				
Lillooet	1924		249	4,225				
	1925	7,098	83	1,415	3,531	72,992		
Clinton	1924		206	3,500				
	1925		95	1,620				
Southern District (No. 4)								
Grand Forks	1924	604			302	6,242	2,891	1,834
	1925	36					709	490
Greenwood	1924	1,364			168	3,473	423,544	268,705
	1925	1,773			53	1,096	480,822	332,060
Osoyoos	1924	48,347			19,119	395,435	4,000	2,537
	1925	50,914			19,426	401,570	2,710	1,872
Similkameen	1924		235	4,000				
	1925	122,996	146	2,482	242	5,002	20,472	14,139
Eastern District (No. 5)								
Fort Steele	1924	1,033,714	305	5,200			2,801,790	1,777,512
	1925	1,117,615	262	4,449			3,106,682	2,145,630
Windermere	1924	1,314					54,385	34,502
	1925	1,276					39,262	27,116
Golden	1924	99					406	258
	1925		2	40				
Ainsworth	1924	15,003			24	496	86,750	55,036
	1925	25,447			16	331	79,057	54,601
Slocan	1924	58,507			365	7,545	953,646	605,012
	1925	64,486			310	6,408	856,375	591,455
Slocan City	1924	23					3,599	2,283
	1925	352					9,458	6,532
Nelson	1924	2,596			84	1,736	7,394	4,691
	1925	6,723			723	14,946	1,652	1,141
Arrow Lake	1924	24			14	290	3,400	2,157
	1925							
Trail Creek	1924	155,543			42,620	880,956	122,474	77,700
	1925	37,596			14,112	291,720	32,353	22,345
Revelstoke	1924		44	750				
	1925		23	500				
Trout Lake	1924	1	15	250			53	34
	1925							
Lardeau	1924							
	1925	7					471	325
South-western District (No. 6)								
Nanaimo	1924							
	1925	68					71	49
Alberni	1924							
	1925							
Clayoquot	1924							
	1925							
Quatsino	1924		18	300				
	1925							
Victoria	1924		12	200				
	1925		6	109				
New Westminster	1924							
	1925							
Vancouver	1924	780,948			4,090	84,540	113,810	72,203
	1925	994,113			8,231	170,150	131,744	90,989
TOTALS	1924	3,397,105	24,750	420,750	247,716	5,120,585	8,341,768	5,292,184
	1925	3,849,269	16,479	280,092	209,719	4,335,269	7,654,844	5,286,818

★ Placer Gold is valued at $17 an ounce, which is believed to be a fair average for the whole Province.

METALLIFEROUS MINES FOR 1924 AND 1925.

COPPER.		LEAD.		ZINC.		TOTALS FOR DIVISIONS.		TOTALS FOR DISTRICTS.
Pounds.	Value.	Pounds.	Value.	Pounds.	Value.	1924.	1925.	1925.
	$		$		$	$	$	$
								11,074,627
		17,385	1,267			149,797		
		1,149	90				90,065	
							700	
						3,325		
							7,500	
35,246,478	4,589,091	334	24			4,992,096		
39,510,163	5,548,017	1,753	138				5,972,875	
746,972	97,256	490,992	35,778			4,952,955		
40	6	839,837	65,910	17,247	1,361		4,168,310	
625,238	81,406					808,109		
677,422	95,124						836,107	
							70	
								289,781
						60,000		
							151,627	
						180,000		
							50,911	
11,162	1,453	754,559	54,985			234,938		
		227,610	17,863				84,243	
						5,000		
							3,000	
								81,256
		1,753	128			210		
18,113	2,543						2,584	
							60	
						1,186		
							1,265	
						541		
						3,099		
							1,320	
						4,225		
							74,407	
						3,500		
							1,620	
								1,267,097
146,974	19,136					27,212		
		19,224	1,509				1,999	
3,564	464	239,635	17,462			290,104		
		258,883	20,317				353,493	
						397,972		
							403,442	
						4,000		
3,464,891	486,540						508,163	
								29,645,518
68	9	160,227,168	11,675,754	73,384,409	3,956,887	17,415,362		
1,696	238	227,305,993	17,839,053	92,164,850	7,273,650		27,263,020	
		1,139,494	83,035			117,537		
		754,494	59,213				86,329	
		133,708	9,743			10,001		
							40	
		1,872,112	136,421	363,751	19,613	211,586		
		2,760,509	216,676	1,537,774	121,360		392,968	
		5,008,172	364,945	5,381,516	290,171	1,267,673		
		4,860,183	381,427	4,413,240	348,297		1,327,587	
		2,699	197			2,480		
		50,302	3,948	91,248	7,202		17,682	
68	9	490,782	35,763	1,294	70	42,269		
		810,877	63,637	32,690	2,580		82,304	
		4,816	351			2,798		
4,235,540	551,466					1,510,122		
1,140,503	160,150						474,215	
						750		
							500	
		872	64			348		
		6,985	548				873	
								4,121,948
2,747	385						434	
						300		
						200		
							109	
23,829,329	3,102,580					3,259,323		
27,450,854	3,860,266						4,121,405	
64,845,393	8,442,870	170,384,481	12,415,917	79,130,970	4,266,741	35,958,997		
72,306,432	10,153,269	237,898,199	18,670,329	98,257,099	7,754,450		46,480,227	46,480,227

TABLE VIII.—COAL AND COKE PRODUCTION PER YEAR TO DATE.

COAL.*

Year.	Tons (2,240 lb.).	Value.
1836-1885	3,029,011	$ 9,468,557
1886	326,636	979,908
1887	413,360	1,240,080
1888	489,301	1,467,903
1889	579,830	1,739,490
1890	678,140	2,034,420
1891	1,029,097	3,087,291
1892	826,335	2,479,005
1893	978,294	2,934,882
1894	1,012,953	3,038,859
1895	939,654	2,818,962
1896	896,222	2,688,666
1897	882,854	2,648,562
1898	1,135,865	3,407,595
1899	1,306,324	3,918,972
1900	1,439,595	4,318,785
1901	1,460,331	4,380,993
1902	1,397,394	4,192,182
1903	1,168,194	3,504,582
1904	1,253,628	3,760,884
1905	1,384,312	4,152,936
1906	1,517,303	4,551,909
1907	1,800,067	6,300,235
1908	1,677,849	5,872,472
1909	2,006,476	7,022,666
1910	2,800,046	9,800,161
1911	2,193,062	7,675,717
1912	2,628,804	9,200,814
1913	2,137,483	7,481,190
1914	1,810,967	6,338,385
1915	1,611,129	5,638,952
1916	2,084,093	7,294,325
1917	2,149,975	7,524,913
1918	2,302,245	11,511,225
1919	2,267,541	11,337,705
1920	2,595,125	12,975,625
1921	2,483,995	12,419,975
1922	2,511,843	12,559,215
1923	2,453,223	12,266,115
1924	1,939,526	9,697,630
1925	2,328,522	11,642,610
Total	65,926,604	$247,375,353

* Net coal and does not include coal made into coke.

COKE.†

Year.	Tons (2,240 lb.).		Year.	Tons (2,240 lb.).	
1895-97	19,396	$ 96,980	1913	286,045	1,716,270
1898 (estimated)	35,000	175,000	1914	234,577	1,407,462
1899	34,251	171,255	1915	245,871	1,475,226
1900	85,149	425,745	1916	267,725	1,606,350
1901	127,081	635,405	1917	159,905	959,430
1902	128,015	640,075	1918	188,967	1,322,769
1903	165,543	827,715	1919	91,138	637,966
1904	238,428	1,192,140	1920	67,792	474,544
1905	271,785	1,358,925	1921	59,434	416,038
1906	199,227	996,135	1922	45,835	320,845
1907	222,913	1,337,478	1923	58,919	412,433
1908	247,399	1,484,394	1924	30,615	214,305
1909	258,703	1,552,218	1925	75,185	526,295
1910	218,029	1,308,174			
1911	66,005	396,030			
1912	264,333	$1,585,998	Total	4,393,255	$25,673,600

† Does not include by-product coke produced from a mixture of British Columbia and Alberta coal at Anyox, but the British Columbia coal so used is credited to the net coal production of the Province.

TABLE IX.—COAL AND COKE: PRODUCTION BY MINERAL SURVEY DISTRICTS,* 1924 AND 1925.

District.	1924.				1925.			
	COAL.†		COKE.‡		COAL.†		COKE.‡	
	Tons (2,240 lb.).	Value.	Tons (2,240 lb.).	Value.	Tons (2,240 lb.).	Value.	Tons (2,240 lb.).	Value.
		$		$		$		$
North-western (No. 1)								
North-eastern (No. 2)	1,228	6,140			1,581	7,905		
Central (No. 3)	66,438	332,190			43,667	218,335		
Southern (No. 4)	160,017	800,085			131,307	659,035		
Eastern (No. 5)	225,511	1,127,555	30,615	214,305	738,710	3,693,550	75,185	526,295
Western (No. 6)	1,486,232	7,431,660			1,412,757	7,063,785		
Totals	1,939,526	9,697,630	30,615	214,305	2,328,522	11,642,610	75,185	526,295

* Detail production by collieries and men employed shown in tables in Chief Inspector's report.
† Net coal and does not include coal made into coke.
‡ Does not include by-product coke produced from a mixture of British Columbia and Alberta coal at Anyox, but the British Columbia coal so used is credited to the net coal production of the Province.

TABLE X.—MISCELLANEOUS MINERALS: PRODUCTION BY MINERAL SURVEY DISTRICTS, 1925.

District.	Flux: Limestone and Silica.	Gypsum.	Arsenic.	Fluorspar.	Pyrite.	Sodium Carbonate.	Talc.	Platinum.	District Totals.
	$	$	$	$	$	$	$	$	$
North-western (No. 1)									
North-eastern (No. 2)									
Central (No. 3)		3,600				9,520			13,120
Southern (No. 4)	35,150		17,421	77,480				1,000	131,051
Eastern (No. 5)					16,890				16,890
Western (No. 6)							1,977		1,977
Totals	35,150	3,600	17,421	77,480	16,890	9,520	1,977	1,000	163,038

TABLE XI.—PRODUCTION IN DETAIL OF BUILDING MATERIALS, 1925.

District and Division.	Cement.	Lime and Limestone.	Building-stone.	Riprap and Crushed Rock.*	Sand and Gravel.	Pottery and Tile.	Clay.	Firebrick.	Face, Front, and Vitrified Brick.	Red Brick.	Totals for Divisions.	Totals for Districts.
	$	$	$	$	$	$	$	$	$	$	$	$
North-western District (No. 1)												41,807
Atlin, Stikine, and Liard				2,000	3,000						5,000	
Nass River				1,000	1,000						2,000	
Portland Canal												
Skeena, Queen Charlotte, and Bella Coola		34,807									34,807	
North-eastern District (No. 2)												24,190
Cariboo and Quesnel		1,000		1,000	3,000						5,000	
Omineca and Peace River				3,800	15,390						19,190	
Central District (No. 3)												20,352
Nicola and Vernon		1,000		2,000	2,000					3,352	8,352	
Yale, Ashcroft, and Kamloops		2,000		5,000	5,000						12,000	
Lillooet and Clinton												
Southern District (No. 4)												5,000
Grand Forks, Greenwood, and Osoyoos		1,000		2,000	2,000						5,000	
Similkameen												
Eastern District (No. 5)												100,688
Fort Steele		1,000		5,000	5,000						11,000	
Windermere and Golden												
Ainsworth												
Slocan and Slocan City												
Nelson and Arrow Lake		2,000	8,500	5,000	26,188						36,688	
Trail Creek		3,000		2,000	25,000					20,000	50,000	
Revelstoke, Trout Lake, and Lardeau		1,000		1,000	1,000						3,000	
Western District (No. 6)												2,488,035
Nanaimo, Alberni, Clayoquot, Quatsino, and Victoria (Vancouver Island)	1,235,318	243,258	9		106,260	12,828				168,845	1,766,518	
Vancouver and New Westminster (Mainland)			12,290	195,472	169,996	55,617	12,959	194,748	80,435		721,517	
Totals	1,235,318	290,065	15,799	225,272	364,834	68,445	12,959	194,748	80,435	192,197	2,680,072	2,680,072

* Flux formerly listed in this column will be found in Table X.

TABLE XII.

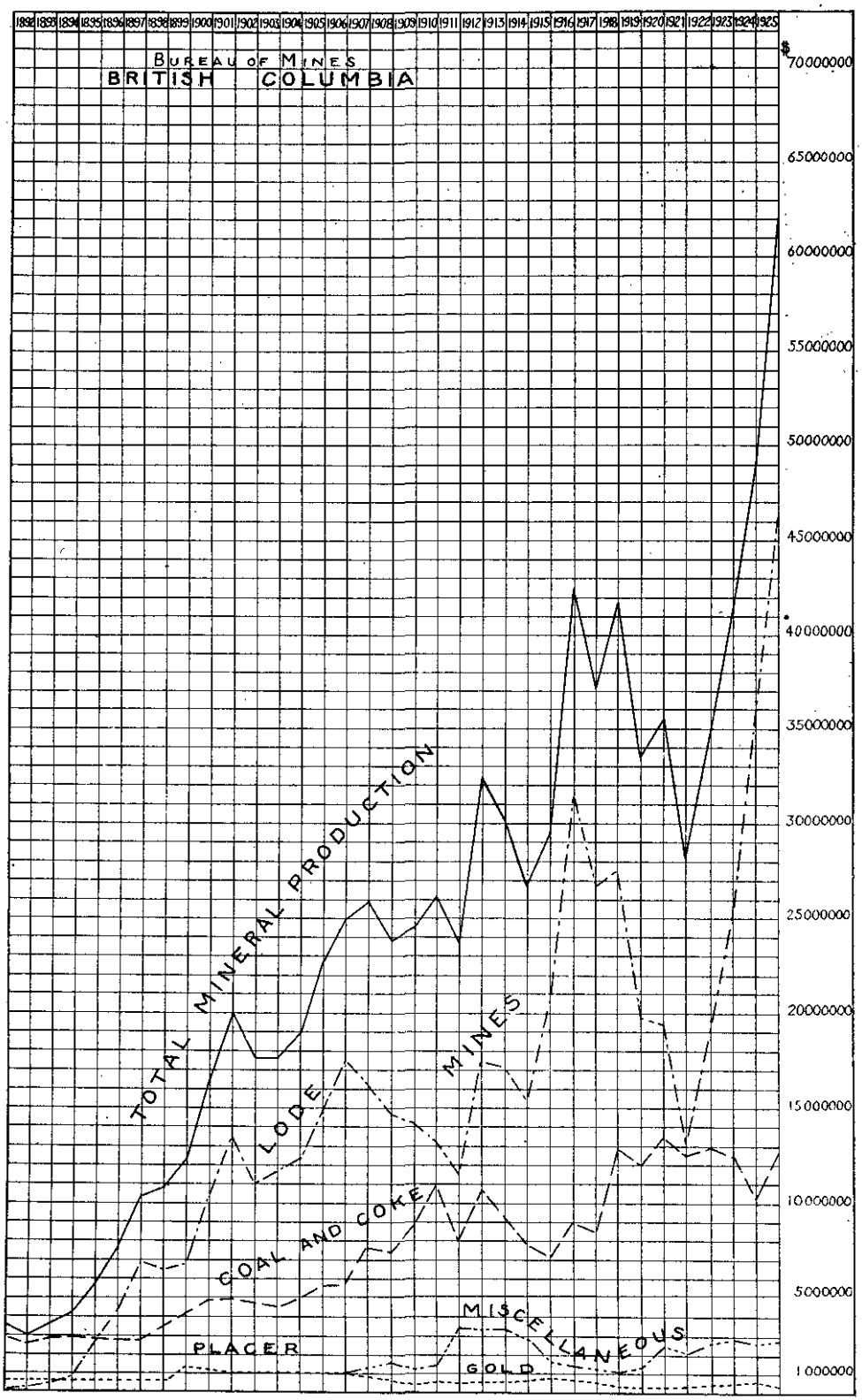

BUREAU OF MINES
BRITISH COLUMBIA
1892 1893 1894 1895 1896 1897 1898 1899 1900 1901 1902 1903 1904 1905 1906 1907 1908 1909 1910 1911 1912 1913 1914 1915 1916 1917 1918 1919 1920 1921 1922 1923 1924 1925
$ 70000000
65000000
60000000
55000000
50000000
45000000
40000000
35000000
30000000
25000000
20000000
15000000
10000000
5000000
1000000
TOTAL MINERAL PRODUCTION
LODE MINES
COAL AND COKE
MISCELLANEOUS
PLACER GOLD

TABLE XIII.

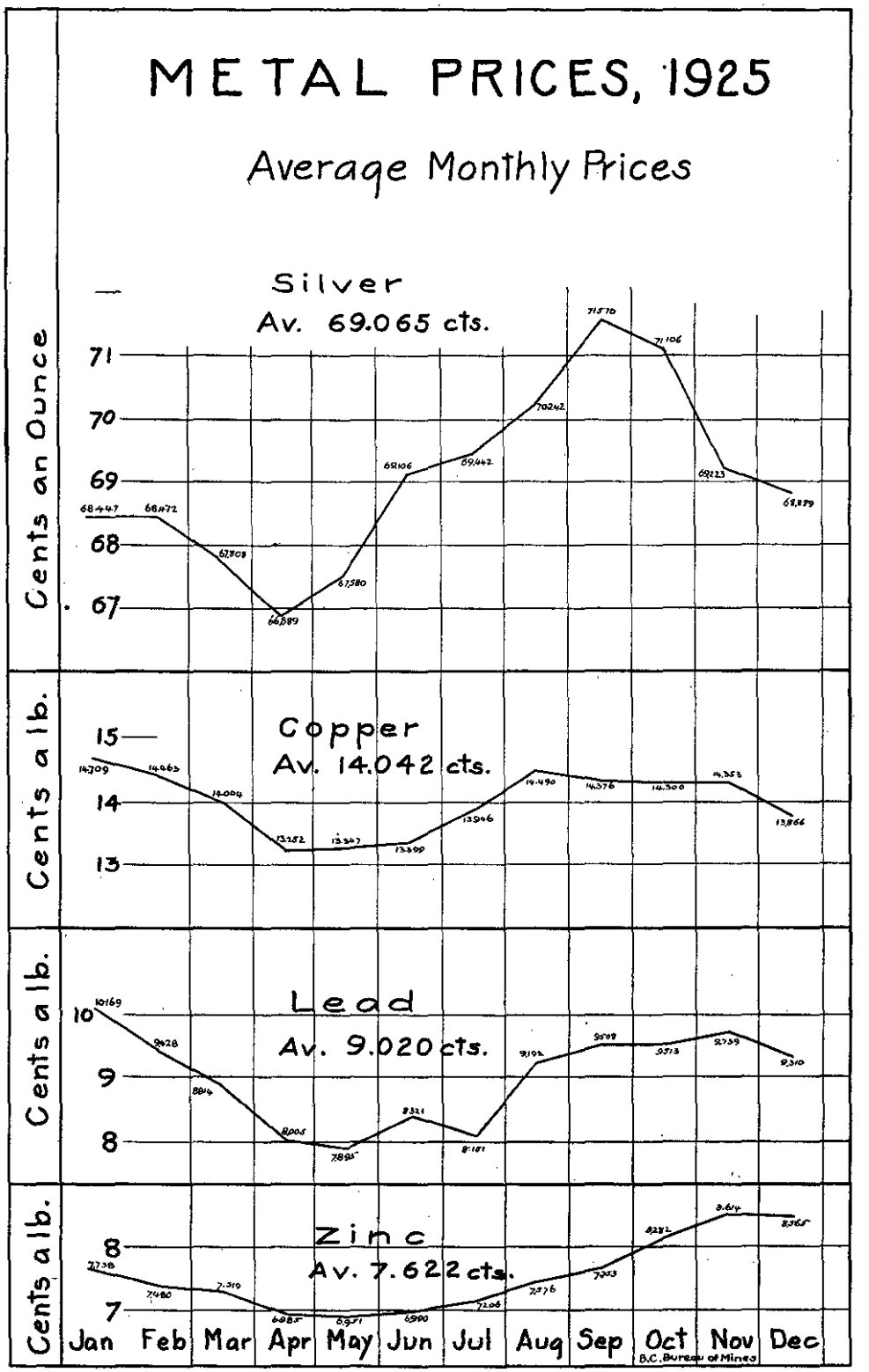
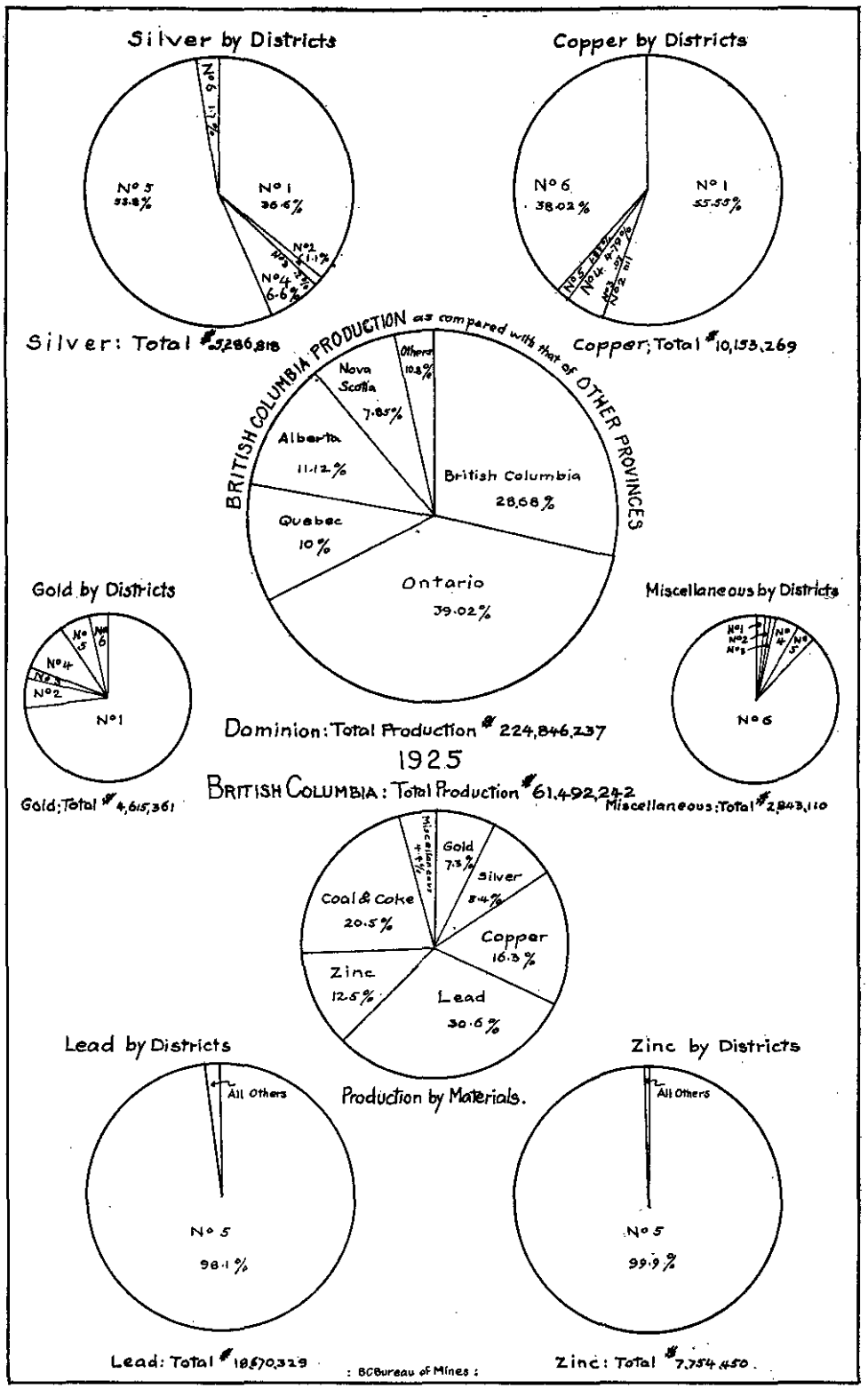

METAL PRICES, 1925
Average Monthly Prices
Silver
Av. 69.065 cts.
Cents an Ounce
71
70
69
68
67
68.447
68.472
67.808
66.889
67.580
69.106
69.442
70.242
71.570
71.106
69.223
68.889
Copper
Av. 14.042 cts.
Cents a lb.
15
14
13
14.709
14.463
14.004
13.252
13.347
13.399
13.946
14.490
14.376
14.300
14.353
13.866
Lead
Av. 9.020 cts.
Cents a lb.
10
9
8
10.169
9.428
8.814
8.005
7.895
8.321
8.151
9.192
9.508
9.513
9.739
9.310
Zinc
Av. 7.622 cts.
Cents a lb.
8
7
7.738
7.480
7.519
6.985
6.951
6.990
7.206
7.576
7.953
8.282
8.614
8.565
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
B.C. Bureau of Mines

TABLE XIV.



NOTE.—Dominion total production shown is Preliminary Estimate.

TABLE XV.

SHIPPING MINES, TONNAGE AND MEN EMPLOYED, 1925.

District and Division.	Tons of Ore shipped.	No. of Mines shipping.	No. of Mines shipping over 100 Tons in 1925.	MEN EMPLOYED IN THESE MINES.*		
				Below.	Above.	Total.
North-western District (No. 1):						
Atlin, Stikine, and Liard	1,710	2	1	35	52	87
Nass River	1,168,695	4	3	267	796	1,063
Portland Canal	168,798	11	2	181	205	386
Skeena, Queen Charlotte, and Bella Coola	78,640	1	1	100	33	133
North-eastern District (No. 2):						
Cariboo and Quesnel	.....	..	..	..	...	...
Omineca and Peace River	842	4	1	..	..	..
Central District (No. 3):						
Nicola and Vernon	83	1	..	8	8	16
Yale, Ashcroft, and Kamloops	1	1	..	..	1	1
Lillooet and Clinton	7,098	1	1	6	9	15
Southern District (No. 4):						
Grand Forks, Greenwood, and Osoyoos	52,723	16	4	114	109	223
Similkameen	122,996	1	1	47	172	219
Eastern District (No. 5):						
Fort Steele	1,117,615	2	1	468	598	1,066
Windermere and Golden	1,276	3	1	21	14	35
Ainsworth	25,447	11	5	60	65	125
Slocan and Slocan City	64,838	32	15	215	124	339
Nelson and Arrow Lake	6,723	6	2	21	16	37
Trail Creek	37,596	3	1	82	57	139
Revelstoke, Trout Lake, and Lardeau	7	1	..	2	1	3
Western District (No. 6):						
Nanaimo, Alberni, Clayoquot, Quatsino, and Victoria (Vancouver Island)	68	1	..	5	3	8
Vancouver and New Westminster (Mainland)	994,113	1	1	487	371	858
Totals	3,849,269	102	40	2,119	2,634	4,753

NON-SHIPPING MINES AND MEN EMPLOYED IN 1925.

District.	NUMBER OF MINES.			MEN EMPLOYED.*		
	Working.	Idle.	Total.	Below.	Above.	Total.
North-western (No. 1)	3	3	6	38	24	62
North-eastern (No. 2)	..	4	4	..	..	..
Central (No. 3)	8	3	11	23	21	44
Southern (No. 4)	6	6	12	9	7	16
Eastern (No. 5)	32	23	65	99	144	243
Western (No. 6)	1	2	3	10	10	20
Totals	50	51	101	179	206	385

* Average men employed for twelve months.

SUMMARY OF STATISTICAL TABLES.

In compiling the Statistical Tables for the 1925 Annual Report the same general arrangement has been followed as in previous years, but the order of the tables has been slightly changed and some new tables have been introduced.

Although the tables showing "Detailed Metalliferous Production" and "Building Materials" have been rearranged, comparisons with previous years can easily be made.

Referring to the preceding Statistical Tables showing the mineral production of the Province, the following is a summary of their contents:—

Table I. shows the total gross value of each mineral product mined in the Province up to the end of 1925, aggregating $920,919,628. From this table it will be seen that coal-mining has produced more than any other separate class of mining, a total of $273,048,953; followed next in importance by copper at $197,642,647, and next in order is lode gold at $122,808,459, with lead in fourth place at $89,218,907.

Table II. shows the value of the total production of the mines of the Province from 1852 to 1895 (inclusive) and for each year from 1896 to 1925 (inclusive). The value of the total mineral production of the Province up to the end of 1925 was $920,919,628.

Table III. gives the quantities in the customary units of measure and the values of the various metals or minerals which go to make up the total of the mineral production of the Province for 1925, and also, for the purpose of comparison, similar data for the two preceding years.

The table shows that in 1925 there were substantial increases in the value of the outputs of lead, zinc, copper, and coal and coke, with small decreases in gold and silver production, as compared with the figures for 1924.

Table IV. shows the proportions of the total mineral productions made in each of the various districts into which the Province is divided.

It will be noted that again this year the Eastern District has the honour of first place on the list, followed, in order of importance, by the Western, North-western, Southern, Central, and North-eastern Districts. The Western and Eastern Districts owe a considerable proportion of their output to the coal-mines situated within their limits, whereas in the other districts the production is chiefly from metal-mining.

The Western District also derives a fair proportion of its production from building materials, due to the larger cities therein; this year this amounted to $2,488,035, as shown in Table XI.

Table V. (formerly Table VI.) shows the statistical record of the placer mines of the Province from 1858 to 1925 and shows a total production of $77,663,045. The output for 1925 was $280,092, a decrease, as compared with the previous year, of $140,658.

Table VI. (formerly Table VII.) relates entirely to the lode mines of the Province, and shows the quantities and values of the various metals produced each year since the beginning, in 1887, of such mining in the Province. The gross value of the product of these mines to date is $523,707,357; this figure includes the zinc production of 1909 and all subsequent years.

Table VII. (formerly Table IX.) gives the details of production of metalliferous mines of the Province for the years 1924 and 1925 and the divisions and districts in which such productions were made, showing the tonnage of ore mined in each district, with its metallic contents and its market value.

The total tonnage of ore mined in the Province during the year 1925 was 3,849,269 tons, having a gross value of $46,200,135, and, with the placer gold, a total value of $46,480,227.

It will be noted that this metalliferous total shows the substantial increase of $10,531,230, or 29.3 per cent.

Table VIII. contains the statistics of production of the coal-mines of the Province. The total net amount of coal produced to the end of 1925 was 65,926,604 tons (2,240 lb.), worth $247,375,353. Of this, there was produced in 1925 2,328,522 tons, valued at $11,642,610. In these figures of coal production the coal used in making coke is not included, as such coal is accounted for in the figures of output of coke. The amount of coal used in making coke in 1925 was 115,770 tons, from which was made 75,185 tons of coke, having a value of $526,295, an increase in amount over the preceding year of 44,570 tons. The total value of the output of the collieries of the Province in 1925 was $12,168,905.

More detailed statistics as to the coal production of the Province are given in the reports of the Inspection Branch.

Table IX. is a new table this year showing the coal production of the Province for 1925 by Mineral Survey Districts and comparative figures for 1924. Detail production by collieries and men employed are shown in two large tables accompanying the Chief Inspector's report.

Table X. is a new table this year introduced to show the production of "Miscellaneous Minerals" by districts. This branch of the industry is small, but an increasing value of production may be expected in the future.

Table XI. is a new table this year showing in detail the production of building materials; this replaces Table V. in former reports. The production in 1925 was $2,680,072, as compared with $2,810,580 in 1924. The decrease is largely accounted for by a marked drop in the output of lime. Rock used as flux by smelters formerly included in Table V. does not appear in this table, but will be found in Table X., "Miscellaneous Minerals."

Table XII. presents in graphic form the facts shown in figures in the tables, and demonstrates to the eye the rapid growth of mining in the Province, and also the fluctuations to which it has been subject.

From this table it will be seen that coal-mining increased steadily until 1909; from then until 1917 a decrease occurred, since which time progress was upward to 1920 and since then there has been a slight decrease. The curve of lode production shows on the average a steady growth, but some marked interruptions have occurred; it is satisfactory that a substantial increase in production has occurred in the last four years. The total mineral production also shows a progressive increase, with, however, some large fluctuations.

Table XIII. shows graphically the metal prices for 1924.

Table XIV. shows graphically the Dominion mineral production in 1925 by Provinces, and the outputs by minerals and districts of the British Columbia production.

Table XV. shows the distribution of shipping and non-shipping mines of the Province with tonnage and men employed.

PROGRESS OF MINING.

The gross value of the mineral production of the Province for the year 1925 was $61,492,242, an increase from that of the preceding year of $12,787,638, or equivalent to an increase of about 26.2 per cent.

It is most satisfactory to note that the above-mentioned output for the year 1925 is the greatest in the history of mining in the Province, and compares with the two previous record productions of $41,782,474 in 1916 and $48,704,604 in 1924.

Quantity increases of production were made in 1925 in the metals copper, lead, and zinc, and in coal and coke. Placer gold, lode gold, and silver showed slight decreases in the quantities produced. The value of building materials shows a slight decrease, while that of miscellaneous minerals shows a considerable increase.

The greater production value in 1925 was in large part due to greater quantities of the various metals and minerals being produced and in part caused by higher metal prices.

The total value of the metalliferous production—that is, the metals gold (including placer gold), silver, copper, lead, and zinc—was $46,480,227, which was $10,521,230 greater than the 1924 output, or an increase of 29.3 per cent.

The largest increase in metal production was in lead, followed by zinc and then copper. The large increases in lead and zinc production were due to the increased output of the smelter and refinery of the Consolidated Mining and Smelting Company at Trail; the bulk of the production comes from the company's *Sullivan* mine at Kimberley and the remainder from the treatment of customs ores and concentrates.

The increased production of copper was due to increases from the Granby Company's mine, mill, and smelter at Anyox and the Britannia Copper Company's mine at Britannia Beach, and to the commencement of operations in August of the Allenby Copper Company's mine and mill near Princeton. Offsetting these increases there was a large decrease in copper-output from the Rossland mines of the Consolidated Company.

Although the production of placer gold in 1925 was considerably less than 1924, the year was a very active one in placer-development and testing of low-grade deposits of gravel. An interesting feature of the year's placer-mining was the successful operation of the Kafue Copper Development Company's dredge near Barkerville, which made an output of gold valued at $95,066.

Lode gold shows a decrease of $785,266 as compared with 1924. This is accounted for by a greatly decreased production from the Rossland mines, which were non-productive during most of the year.

The net coal production for 1925 shows a substantial increase as compared with 1924, the increase amounting to 388,996 tons. The increase in output was from the Crowsnest district, where over three times as much coal was produced as in the preceding year. The mines in this district were closed during a large part of 1924 owing to labour troubles, and the output was very much less than normal. Amicable arrangements have now been made with labour, lost markets have been regained, and the industry is now in a healthy condition in the Crowsnest district. The 1925 production of coke showed the considerable increase of 44,570 tons as compared with the 1924 output.

A decrease in production occurred in 1925 in the Nicola-Princeton district and a very slight decrease in the Vancouver Island district. Competition from foreign crude oil is still keenly felt by the Vancouver Island mines.

A slightly decreased output of building materials was made in 1925, as compared with the preceding year, but it is believed that there was nearly as much building and construction as in 1924.

It is interesting to note that the mineral industry of British Columbia has steadily increased with but few yearly set-backs. Thirty years ago (in 1895) the Province only produced minerals to the value of $5,643,042, and even ten years ago (in 1915) the production was less than half that of the present year, being only $29,447,508.

METAL PRICES.

Metal prices generally for the year 1925 in the world's markets were somewhat higher than in 1924. The prices used in this Report were higher in 1925 for silver, copper, and zinc than in the preceding year, but slightly lower for lead; the decrease in the average lead price is owing

to the London price being used instead of the New York price, which was taken in 1924. The following table gives comparative figures for the two years:—

AVERAGE METAL-MARKET PRICES FOR 1924 AND 1925.

Year.	Silver (New York).	Copper (New York).	Lead.		Zinc.	
			London.	New York.	London.	St. Louis.
	Cents per Oz.	Cents per Lb.	Cents per Lb.	Cents per Lb.	Cents per Lb.	Cents per Lb.
1924.	*66.78	*13.02	6.844	*8.09	6.706	*6.34
1925.	*69.065	*14.042	*7.848	9.020	*7.892	7.622

* Prices used in compiling total metal valuations in 1924 and 1925 Annual Reports.

Table XIII. in the Statistical Tables shows the monthly fluctuations of the metal-market prices for the year 1925.

The prices of silver, lead, and zinc are now excellent and it is expected that the present average level of prices will be well maintained in the future. During 1925 the average price of copper was a little more than a cent a pound higher than in 1924. The present 14-cent level for copper is expected to be maintained and this price is good enough to gradually stimulate copper production in British Columbia.

Costs of mining, including wages and supplies, have been pretty well stabilized during the last two years. So that with good metal prices and reasonable costs the future for metal-mining in British Columbia is most favourable and the industry will undoubtedly have a prosperous year in 1926.

DEVELOPMENT.

The year 1925 has, however, been an important one not only for a record production, but also for the large amount of development, exploration, and prospecting that has been carried out. Production in any one year is largely the result of previous development, so that, to have a healthy industry, development and prospecting must keep pace with production. It may be conservatively said that in the year 1925 a greater amount of real development was done than in any previous year in the history of the Province, and much of this development has been satisfactory in adding substantial new ore reserves to the industry.

A large number of prospects have been bought or optioned and more or less development-work done on them. Prospecting has been fairly active and some new discoveries have been reported. The movement which has taken place in acquiring and developing prospects which have lain dormant for years will be a great incentive to still further prospecting next year.

Commencing with the North-western District (No. 1), the year 1925 has been the most progressive one in its history. The *Premier* mine is doubling the capacity of its concentrator. Announcements have been made by the management of the B.C. Silver Mines indicating that the last four years of development have been most satisfactory in proving the existence of large and valuable ore-bodies.

The *Big Missouri* property, which has been bonded and given up several times, was developed during the summer by a Tacoma syndicate, with satisfactory results. Thirty to forty properties in the Portland Canal Division (part of District No. 1) have been more or less developed this year. It can only be expected that a relatively small percentage of this number will develop into profitable mines. But on the whole much progress has been made this year. In the Atlin Division important work has been going on. The best-known property there is the *Engineer* gold-mine. This property made some production and it is expected that in the future it will be a considerable contributor to the gold-output of the Province.

In the North-eastern District (No. 2) the most important event was the reopening of the *Henderson* mine at Smithers by Duthie Mines, Limited. This property is now shipping about 300 tons a month of high-grade silver-lead ore. Several properties were reopened in the Hazelton and Telkwa sections and small-scale operations carried on, including the shipment of hand-sorted high-grade ore from several of them.

The operation of the Kafue Copper Development Company's gold-dredge at Barkerville, in the Cariboo Division, has been of unusual interest. The dredge is handling about 2,000 cubic yards a day at an operating cost of 10 cents a yard. The ground worked carries from 25 to 50 cents a yard and several years' supply has been proven.

In the Central District (No. 3) the important developments of the year have been the reopening of the *Iron Mask* mine at Kamloops, where a development campaign is under way, including the sinking of a new shaft; the opening-up of the gypsum-deposit at Falkland, on the new Kelowna–Kamloops branch of the Canadian National Railway, by the B.C. Gypsum Company; the bonding of the *Windpass* property at Chu Chua by Eastern interests and the commencement of vigorous development by them; and a number of placer-mining enterprises at different points throughout the district.

In the Southern District (No. 4) the reopening of the *Copper Mountain* mine and mill in August was of considerable importance. This, of course, is not new development but is the result of development in the past years, now expressed as production.

The old Beaverdell camp, which has been reviving steadily for the last three years, has been the centre of great activity. The revival of the camp started with the successful operation of the *Bell* by Duncan McIntosh; this was followed by the *Sally*, which was developed by a local Penticton syndicate. Many claims in the camp have now been bonded, bought, or optioned and steady development is proceeding on many of them. The ores in this camp are rich in silver and many car-load shipments assay from 250 to 500 oz. to the ton. The *Horn Silver* mine near Similkameen is being operated by Vancouver interests and a small concentrator is being erected. A lot of work has been done this year in drilling, testing, and working placer deposits on the Similkameen and Tulameen rivers.

The Eastern District (No. 5) comprises East and West Kootenay and is the most important mining district of the Province. It includes the famous *Sullivan* mine at Kimberley, the Slocan district, and the large metallurgical plant of the Consolidated Mining and Smelting Company at Trail. A vigorous policy of expansion has been in progress by this company during recent years. The basis of this expansion is to be found in the enormous deposit of low-grade silver-lead-zinc ore at the *Sullivan* mine. For years the efficient treatment of the complex ore was an unsolved problem and much research-work in concentration of the ore and its metallurgical treatment were necessary before a solution was found. This year the zinc plant at Trail was doubled, giving it a capacity of 200 tons a day, and the lead plant increased to 350 tons a day.

The copper-refinery at Trail is now in operation and with an assured supply of copper concentrates from Allenby a steady output of copper bars and rods will be made in the future. It manufactures for its own requirements sulphuric acid and hydrofluosilicic acid from British Columbia raw materials. Besides mining, smelting, and refining its own ores from various properties, the Trail plant is a custom plant, treating ores from nearly all the mines in the Southern Interior of British Columbia.

Important development-work was carried out at the *Stemwinder* and *North Star* mines by the Porcupine Goldfield Development and Finance Company, Limited. Other properties which were actively developed were the *Monarch* and *Kicking Horse* mines at *Field*, the *Ruth-Hope* at Sandon, the *Carnation* group at Sandon, the *McAllister* near Three Forks, the *Whitewater* near Kaslo, and the *Emerald* and *Reno* in the Sheep Creek section.

No. 5 District includes the oldest lode-mining camps in the Province and it is most satisfactory to be able to say that the yearly production is steadily increasing.

In the Western District (No. 6) the only important shipping-mine is that of the Britannia Mining and Smelting Company. This company's property is now in first-class condition, making a larger production than ever, and development being kept well ahead in order to maintain the ore reserves.

Steady development of the *Old Sport* mine in Quatsino Division, with a crew of forty to fifty men during the year, is reported. This is a copper-gold property and the ore reserves now proven are sufficient to make certain that before long the property will be equipped so that it will become productive.

A number of old properties in the district have been taken up during the year and development of them commenced; among these were the *Doratha Morton* and *Monte Christo* properties in the Phillips Arm section; the *Florence* and adjoining claims, now owned by the Malaspina Mines, Limited, a zinc property near Lund which gives promise of a large tonnage of zinc-copper ore, and many other properties.

PROFITS OF MINING COMPANIES.

The following table shows the dividends declared by companies engaged in the mining industry in the Province during 1925:—

Company.	1925.
Consolidated Mining and Smelting Co. of Canada, Ltd.	$3,238,054
Premier Gold Mining Co.	1,600,375
Howe Sound Copper Co.*	467,189
Silversmith Mines, Ltd.	125,000
Wallace Mountain Mines, Ltd.	59,400
I.X.L.	21,600
Bell	88,000
Belmont-Surf Inlet	312,500
Crow's Nest Pass Coal Co.	372,690
Coast Quarries	10,000
Gilley Bros.	5,000
Clayburn Co.	20,000
Total for year	$6,319,808

The amount of $6,319,808 shown above as distributed in 1925 by no means represents the total of net profits earned during that year. In nearly all cases substantial sums are set aside from profits to the credit of surplus and reserve accounts. Profits accruing to private companies and individual mining enterprises as a rule are not given publicity as dividends, as is the case with the large companies, so that no record of these profits, which in the aggregate are considerable, is available.

REVIEW BY METALS AND MINERALS.

GOLD.

Placer Gold. The recovery of placer gold for 1925 was $280,092, of which nearly all was obtained from the Atlin, Cariboo, and Quesnel Divisions. The output shows a decrease, as compared with 1924, of $140,658, which is partly accounted for by a marked decrease in the Atlin production, where the two largest operators did not make any output. A shortage of water for hydraulic mining was general throughout the Province owing to 1925 being a dry year, which fact also curtailed the production.

The Cariboo Division output was increased by the production of the Antler Creek dredge of the Kafue Copper Company, but all other Divisions of the Province showed decreases. Although production decreased in 1925, more exploratory and development work was carried on than usual and it is probable that in 1926 a larger output will be made.

Gold from Lode-mining. The value of lode gold produced in 1925 was $4,335,269, as compared with $5,120,535 in 1924, a decrease of $785,266, or about 15.3 per cent. Of the total, Portland Canal Division produced $2,448,967, or 56.5 per cent. The decrease in production as compared with 1924 was largely due to a marked falling-off in output of the Rossland mines. A decrease in the gold-output of Portland Canal Division is accounted for by a slightly lessened production of gold from the *Premier* mine.

* The Howe Sound Copper Company is the holding company for the *Britannia* mine in British Columbia and the *El Potosi* mine in Mexico. Dividends paid by this company are therefore derived from the profits on operation of both mines, so that only part of the dividends paid, as shown, can be credited to the *Britannia* mine.

The following table shows the gold production for the years 1924 and 1925:—

Mining Divisions.	1924. Oz.	1925. Oz.
Portland Canal	139,462	118,469
Skeena	34,673	35,086
Osoyoos	19,119	19,426
Trail Creek	42,620	14,112
Nass River	6,323	7,484
Vancouver	4,090	8,231
Lillooet	.....	3,531
Atlin	5	1,878
All others	1,424	1,502
Totals	247,716	209,719

SILVER.

The quantity of silver produced in 1925 was 7,654,844 oz., worth $5,286,818, a decrease from the production of 1924 in quantity of 686,924 oz., or 8.25 per cent., and in value of $5,366.

The market price of silver advanced slightly during the year, the average price for the year being 69.065 cents an ounce, as compared with 66.78 cents in 1924.

The decreased production of silver was mainly due to a lower output from the *Premier* mine in Portland Canal Division, partly offset by an increase from the *Sullivan* mine in Fort Steele Division. The *Sullivan* mine is now the largest silver-producer in the Province, followed by the *Premier*.

The following table shows the silver production by Mining Divisions for the years 1924 and 1925:—

Mining Divisions.	1924. Oz.	1925. Oz.
Fort Steele	2,801,790	3,106,682
Portland Canal	3,053,562	2,392,046
Slocan	953,646	856,375
Greenwood	423,544	480,822
Nass River	429,186	390,954
Omineca	262,759	85,888
Vancouver	113,810	131,744
Trail Creek	122,474	32,353
Ainsworth	86,750	79,057
All others	94,247	98,923
Totals	8,341,768	7,654,844

COPPER.

The amount of copper produced in 1925 was 72,306,432 lb., valued at $10,153,269. This represents, as compared with 1924, an increase of 7,461,039 lb., or 11.5 per cent., and an increase in value of $1,710,399, or 20.3 per cent. The increased production in 1925 was due to larger outputs from the *Hidden Creek* and *Britannia* mines and the commencement of production by the Allenby Copper Company.

The average price of copper for the year was 14.042 cents a pound, which compares with 13.02 cents for 1924.

The following table shows the production of copper according to Mining Divisions in 1924 and 1925:—

Mining Divisions.	1924. Lb.	1925. Lb.
Nass River	35,246,478	39,510,163
Vancouver	23,829,329	27,490,854
Similkameen	.....	3,464,891
Trail Creek	4,235,540	1,140,506
Skeena	625,238	677,422
All others	908,808	22,596
Totals	64,845,393	72,306,432

The Granby Company at Anyox in 1925 produced about 54.6 per cent. of the total output of copper of the Province and the *Britannia* mine 38 per cent.

LEAD.

The amount of lead produced in 1925 was 237,899,199 lb., valued at $18,670,329. This represents, as compared with the previous year, an increase in quantity of 67,514,718 lb. and in value of $6,254,412. This is an increase in quantity of 39.7 per cent. and an increase in value of 50.2 per cent.

The average London market price of lead in 1925 was 7.848 cents a pound.

The following table shows the production of lead, according to Mining Divisions, for the years 1924 and 1925:—

Mining Divisions.	1924. Lb.	1925. Lb.
Fort Steele	160,227,168	227,306,993
Slocan	5,008,172	4,860,183
Ainsworth	1,872,112	2,760,909
Windermere	1,139,494	754,494
Portland Canal	490,992	839,837
Nelson	490,782	810,877
Greenwood	239,635	258,883
Omineca	754,559	227,610
All others	161,567	79,413
Totals	170,384,481	237,899,199

From the above table it will be seen that there were increases in Fort Steele, Ainsworth, and Nelson Divisions.

The Fort Steele Division continues to head the list, producing 227,306,993 lb. of lead, which is 95.4 per cent. of the total output of the Province for the year, while Slocan produced 2.04 per cent. of the Provincial production. The large output from the Fort Steele Division comes from the *Sullivan* mine. In the Slocan the largest producer was the *Silversmith*. The production from Windermere was chiefly from the *Paradise* mine.

ZINC.

The quantity of zinc produced in 1925 amounted to 98,257,099 lb., valued at $7,754,450. Compared with the 1924 output this is an increase of 19,126,129 lb., or 24.2 per cent., and an increase in value of $3,487,709, or 81.8 per cent.

The average London price of zinc for the year was 7.892 cents a pound. The outlook for a good price in 1926 is most promising.

The following table shows the production of zinc according to Mining Divisions for the years 1924 and 1925:—

Mining Divisions.	1924. Lb.	1925. Lb.
Fort Steele	73,384,409	92,164,850
Slocan	5,381,516	4,413,290
Ainsworth	363,751	1,537,774
All others	1,294	141,185
Totals	79,130,970	98,257,099

The above table shows that 93.8 per cent. of the zinc produced in the Province in 1925 was from the Fort Steele Division.

OTHER MINERALS.

Iron. No record has been received of any iron ore shipped during 1925. The report on the examination of the iron-ore deposits of British Columbia by Dr. Young and Dr. Uglow, of the Geological Survey of Canada, has been completed and will be issued as a printed report some time during 1926 by the Geological Survey. The iron-deposits at Kitchener were carefully examined during the year by W. R. Wilson.

Platinum. Platinum occurs in irregular and variable amounts in the placer deposits of the Tulameen and Quesnel River sections. Small amounts of crude platinum were recovered in placer operations on the Tulameen river, the output being estimated at $1,000. It is known that some small lots of black sand were shipped to Swansea for treatment, but no returns have yet been received.

Tin. It has been known for some time that a small amount of tin occurs in the ores of the *Sullivan* mine, but until 1925 no attempt had been made to recover it. During the year successful arrangements were made to save the tin, which occurs as cassiterite, as a table concentrate from the mill treatment of the *Sullivan* ore.

The following information has been received from the Consolidated Company, owners of the *Sullivan* mine: "The production of tin concentrates was incidental to other concentration. The recovery for the year amounted to 124 tons of concentrates, containing 13,000 lb. of tin. This material is of no commercial value until methods of reduction are perfected."

As this output of tin concentrate is at present stored for furher treatment it has not been included in the production figures for 1925, but will be valued and included when reduced to the metallic state or sold. This is the first record of the production of tin ore or tin concentrate in British Columbia and it is therefore a matter of particular interest.

NON-METALLIC MINERALS.

Fluorspar. The *Rock Candy* fluorspar mine, owned by the Consolidated Mining and Smelting Company, was operated for three months during the year and 3,874 tons of crude fluorspar was mined and shipped to Trail without concentration. This mineral is used for making hydrofluoric acid which is used in the lead-refinery at Trail.

Sodium Carbonate. A production of 11,120 tons of sodium carbonate was made in 1925, valued at $9,520. The output was made by three shippers from small lakes in the Clinton Division. The mineral is shipped over the Pacific Great Eastern Railway for consumption in Vancouver and district.

Arsenic.—From the arsenical-iron-gold concentrates of the *Nickel Plate* mine $17,421 worth of arsenic was recovered at the Tacoma smelter.

Talc.—A production of 138 tons of talc was made by the Eagle Talc and Mining Company, Limited, Victoria, B.C.

COAL AND COKE.

The gross production of coal in 1925 was 2,444,292 long tons, of which 115,770 tons was made into coke, leaving the net production at 2,328,522 tons. These figures show an increase, as compared with 1924, of 456,759 tons gross and of 388,996 tons net. The quantity of coke made

was 75,185 tons, which is an increase of 44,570 tons as compared with 1924. For purposes of comparison the following table is shown:—

	1920.	1921.	1922.	1923.	1924.	1925.
Coal, gross.....tons, 2,240 lb..	2,696,774	2,569,639	2,580,915	2,542,987	1,987,533	2,444,292
Less made into coke "	101,649	85,644	69,072	89,764	48,007	115,770
Coal, net..... "	2,595,125	2,483,995	2,511,843	2,453,223	1,939,526	2,328,522
Coke made..... "	67,792	59,434	45,835	58,919	30,615	75,185

Summarizing the Provincial gross production of coal, the following table shows the output:—

	1922.	1923.	1924.	1925.
Vancouver Island mines.....tons, 2,240 lb.	1,754,656	1,574,663	1,486,332	1,412,757
Nicola-Princeton mines ..... "	270,890	227,393	226,455	175,474
Crowsnest mines..... "	554,361	740,531	273,518	854,480
Northern District..... "	1,008	400	1,228	1,581
Total quantity of coal mined.. "	2,580,915	2,542,987	1,987,533	2,444,292
Less made into coke..... "	69,072	89,764	48,007	115,770
Net quantity of coal produced "	2,511,843	2,453,223	1,939,526	2,328,522

In addition there was made a coke production as shown in the following table, but which does not include by-product coke made at Anyox from a mixture of British Columbia and Alberta coal. The British Columbia coal so used is credited to the net coal production of the Province.

	1922.	1923.	1924.	1925.
Vancouver Island collieries.....tons, 2,240 lb.	4,435	*Nil*	*Nil*	*Nil*
Nicola-Princeton collieries..... "	*Nil*	*Nil*	*Nil*	*Nil*
Crowsnest District collieries..... "	41,400	58,919	30,615	75,185
Total coke production.. ... "	45,835	58,919	30,615	75,185

As will be seen from the above figures, the net coal production this year is 388,996 tons more than it was in 1924.

The greater part of the gross Provincial coal production is still being mined by three companies—the Crow's Nest Pass Coal Company of East Kootenay, the Canadian Collieries (Dunsmuir), and the Western Fuel Corporation of Vancouver island, which mined, collectively, 76 per cent. of the gross output.

Of the other collieries: In the Coast District, on Vancouver island, the Nanoose Collieries, Limited, produced 75,680 tons; the Granby Company, from its colliery near Cassidy, produced 192,801 tons; and King & Foster, conducting operations at the Old Wellington, made a production of 16,648 tons; and, in addition, the East Wellington Coal Company produced 54,358 tons. In the Nicola Valley section of the district the Middlesboro Colliery Company mined 37,686 tons; the Keystone Coal Company, Limited, produced 5,927 tons; the Princeton-B.C. Colliery Company, Limited, 7,079 tons; the Coalmont Colliery, 117,877 tons; the Tulameen Valley Coal Company, Limited, produced 6,851 tons; and the Sunshine Coal Company, a new producer, 54 tons.

In the Northern District the Telkwa Collieries, Limited, shipped 1,581 tons. This property for convenience has been included in the Coast District figures.

In the East Kootenay District, in addition to the Crow's Nest Pass Coal Company, which produced 785,668 tons, the Corbin Coals, Limited, produced 68,812 tons.

The collieries of the Coast District, including the Nicola-Princeton and Telkwa fields, are to be credited for 1925 with about 65 per cent. of the total coal-output.

The gross output of the collieries of the Province for 1925 was, as already stated, 2,444,292 tons, which includes 26,416 tons of coal added to stock.

Of this gross amount, there was sold for consumption in Canada, 1,566,206 tons; sold for consumption in the United States, 391,883 tons; sold in other countries, *nil;* making the total coal sales for the year 1,958,089 tons of 2,240 lb.

In addition to the coal sold, there was used in the manufacture of coke 115,770 tons, and used under companies' boilers, etc., 195,080 tons; while 148,937 tons was lost in washing and screening.

The coke sales of the Province for 1925 amounted to 75,089 tons, which, together with 96 tons added to stock, makes a total production of coke of 75,185 tons.

The following table indicates the markets in which the coal and coke output of the Province was sold:—

COAL.	Coast District.	Crowsnest Pass District.	Total for Province.
Sold for consumption in Canada .....tons, 2,240 lb.	1,135,000	431,206	1,566,206
" export to United States ..... "	142,447	249,436	391,883
" export to other countries ..... "	*Nil*	*Nil*	*Nil*
Total coal sales	1,277,447	680,642	1,958,089
COKE.			
Sold for consumption in Canada .....tons, 2,240 lb.	*Nil*	53,153	53,153
" export to United States ..... "	*Nil*	21,936	21,936
" export to other countries ..... "	*Nil*	*Nil*	*Nil*
Total coke sales	*Nil*	75,089	75,089

COLLIERIES OF COAST DISTRICT.

The collieries of the Coast District, which includes those on Vancouver island and in the Nicola-Princeton fields and one small colliery in Omineca District, mined 1,589,812 tons of coal in 1925, of which 19,350 tons was added to stock, making 1,570,462 tons distributed from these collieries in 1925. This amount was distributed thus:—

	Tons.	Tons.
Sold as coal in Canada	1,135,000	
Sold as coal in United States	142,447	
Sold as coal in other countries	*Nil*	
Total sold as coal		1,277,447
Used under companies' boilers, etc.		144,078
Used in making coke		*Nil*
Lost in washing, etc.		148,937
		1,570,462
Plus coal added to stock		19,350
Gross output		1,589,812

The total coal sales of the Coast collieries for the year show, as compared with the sales of the previous year, a decrease of 114,870 tons, equivalent to about 8 per cent.

The coal sold in Canada by the collieries of the Coast District this year shows a decrease of 118,305 tons, or about 9 per cent. less than the preceding year; the amount exported to the United States was 182,197 tons more than the preceding year, an increase of about 86 per cent.

No coke was produced in the Coast District this year.

On Vancouver island six companies produced coal in 1925—the Canadian Collieries (D.), Limited, the Western Fuel Corporation of Canada, Limited, the Granby Consolidated Mining,

Smelting, and Power Company, the Nanoose-Wellington Collieries, Limited, the property operated by King & Foster, and the East Wellington Coal Company; the majority of these companies each operate two, or more, collieries. The combined gross output of the Island collieries was 1,412,757 tons.

In the Nicola and Princeton coalfields of the Coast District the Middlesboro Colliery Company produced 37,686 tons of coal; the Keystone Coal Company, 5,927 tons; the Princeton Colliery, 7,079 tons; the Coalmont Collieries, 117,877 tons; the Tulameen Valley coal-mine, 6,851 tons; and Sunshine Coal Company, 54 tons. The total output of this portion of the sub-district was 175,474 tons.

The Telkwa Collieries produced 1,581 tons.

EAST KOOTENAY COALFIELD.

There were only two companies operating in this district in 1925—the Crow's Nest Pass Coal Company, operating two separate collieries, which together mined 785,668 tons; and the Corbin Coal and Coke Company, which mined 68,812 tons; making a gross output for the district for 1925 of 854,480 tons of coal.

The amount of coal actually distributed was 847,414 tons, which, together with 7,066 tons added to stock, shows the total production of 854,480 tons.

Of this gross tonnage, 115,770 tons was used in the manufacture of coke, of which there was produced 75,185 tons (2,240 lb.) including 96 tons added to stock.

The following table shows the distribution made of the coal of this district:—

	Tons.	Tons.
Sold as coal in Canada	431,206	
Sold as coal in United States	249,436	
Total sold as coal		680,642
Used by the companies in making coke		115,770
Used by the companies under boilers, etc.		51,002
		847,414
Plus coal added to stock		7,066
Gross output		854,480

BUILDING MATERIALS.

It is difficult to get complete statistics of the production of structural materials such as cement, lime, building-stone, sand and gravel, brick and other clay products. The output for 1925 has been valued at $2,680,072, which is a decrease of $130,508 as compared with 1924. The decrease is mainly due to a reduction in the output of lime. Building activity was about the same throughout the Province in 1925 as in the preceding year, even though a slight decrease is shown in the production of building materials.

Approximately 92 per cent. of the total production of building materials comes from the Coast District and the larger part of this is marketed in the Coast cities.

Increases were made in 1925 as compared with the preceding year in the outputs of red brick, sand and gravel, and crushed rock.

Building-stone. The production of building-stone in 1925 is valued at $15,799. Excellent building-stone of various sorts is found in abundance in almost every part of the Province; the fact of its widespread distribution has, however, been somewhat against the establishment of large quarrying industries, as a sufficient local supply could always be obtained, and, except within reach of the larger cities, few regularly equipped quarries have been opened.

Red Brick.—The production of red brick during 1925 was valued at $192,197. The price given by the operators varies from $12 to $18 a thousand, depending on quality.

Firebrick. The only company producing firebrick in the Province is the Clayburn Company, Limited, with a plant at Clayburn. The fireclay is found here as a bed occurring in bedded rocks of Eocene age. Shales, sandstones, and conglomerates, all but little consolidated, make up this sedimentary series. The shales are quarried or mined

for brick-making and one bed is an excellent fireclay. Associated with these rocks is a bed of lignite which is sufficiently good to be used for firing the boilers of the plant. Firebrick is the principal manufactured article produced by this company, but, in addition, considerable quantities of paving-brick, tiles, drain-pipes, fireclay blocks and shapes, and prepared fireclay are made.

Lime.

The manufacture of lime is conducted in a small way at a large number of points in the Province, but only on the Coast has any attempt been made at more extensive operations. In the neighbourhood of Victoria, on Esquimalt harbour, two kilns are in operation. There are two plants on Texada island, where, at Marble bay and at Blubber bay, the limestone being used is of exceptional purity.

The production of lime and limestone for 1925 is valued at $290,065, as compared with $454,566 (including flux) in 1924.

Sand, Crushed Rock, and Gravel.—The returns for crushed rock indicate an increased demand for this material, the value of the 1925 production being $225,272. The sand and gravel production in 1925 was $364,834, as compared with $302,376 in 1924.

REPORTS OF RESIDENT MINING ENGINEERS.

"MINERAL SURVEY AND DEVELOPMENT ACT."

During the session of 1917 the Hon. the Minister of Mines brought in the "Mineral Survey and Development Act," which was passed on May 19th, 1917, and under the provisions of which the Province was divided into six Mineral Districts, to each of which there was appointed a Resident Mining Engineer with headquarters at a centrally located point in such district.

In the district to which he was appointed the Resident Engineer is expected to devote his whole time to the performance of the duties of his office, and to carry on continuously a mineral survey of his district, keeping records of the same and of the mining and mineral developments taking place, and at the same time to assist prospectors and others with such advice as may be necessary and may come within the scope of a mining engineer's work.

Aside from special reports which may be called for by the Minister, the Resident Mining Engineers are expected annually to make a comprehensive report covering all matters relating to mining, mine development, and prospecting that have occurred within the year in their respective districts.

These annual reports of the Resident Mining Engineers follow, and form the basis of the information given in respect to the mineral industry and its development within the Province.

The following are the six Mineral Districts into which the Province is divided, with the Mining Divisions included in each and the location of the permanent office of the district, with the name of the Resident Mining Engineer appointed to each district:—

The North-western Mineral Survey District (No. 1) shall consist of that portion of the Province contained within the following Mining Divisions, that is to say: Atlin, Stikine, Liard, Skeena, Nass River, Portland Canal, Bella Coola, and Queen Charlotte; and shall have its permanent survey station and office at the City of Prince Rupert. Resident Mining Engineer, Geo. A. Clothier.

The North-eastern Mineral Survey District (No. 2) shall consist of that portion of the Province contained within the following Mining Divisions, that is to say: Omineca, Peace River, Cariboo, and Quesnel; and shall have its permanent survey station and office at Hazelton. Resident Mining Engineer, Douglas Lay.

The Central Mineral Survey District (No. 3) shall consist of that portion of the Province contained within the following Mining Divisions, that is to say: Clinton, Lillooet, Kamloops, Ashcroft, Nicola, Vernon, and Yale; and shall have its permanent survey station and office at the City of Kamloops. Resident Mining Engineer, H. G. Nichols.

The Southern Mineral Survey District (No. 4) shall consist of that portion of the Province contained within the following Mining Divisions, that is to say: Similkameen, Greenwood, Grand Forks, and Osoyoos; and shall have its permanent survey station and office at the City of Grand Forks. Resident Mining Engineer, Philip B. Freeland.

The Eastern Mineral Survey District (No. 5) shall consist of that portion of the Province contained within the following Mining Divisions, that is to say: Golden, Windermere, Fort Steele, Ainsworth, Slocan, Slocan City, Trout Lake, Nelson, Arrow Lake, Revelstoke, Lardeau, and Trail Creek; and shall have its permanent survey station and office at the City of Revelstoke. Resident Mining Engineer, A. G. Langley.

The Western Mineral Survey District (No. 6) shall consist of that portion of the Province contained within the following Mining Divisions, that is to say: Nanaimo, Alberni, Clayoquot, Quatsino, Victoria, Vancouver, and New Westminster; and shall have its permanent survey station and office at the City of Nanaimo. Resident Mining Engineer, W. M. Brewer.

PROVISIONS FOR THE PROTECTION OF INVESTORS.

The attention of those engaged in mining is drawn to the following sections of the "Mineral Survey and Development Act":—

Sec. 16. Each Resident Engineer shall, upon receiving notice of any advertised or solicited sale of shares in any company or in any claim or mine or mineral property whatsoever, upon

statements or terms not in accordance with actual facts and conditions, notify the Minister of Mines, who upon investigation may, if found necessary, give such notices, either personal or public, as may be necessary to prevent any injury to investors; and every notice given under this section by the Minister of Mines shall be absolutely privileged.

Sec. 17. (1.) Where a corporation, other than a private company under the "Companies Act," acquires an interest in, or title to, or engages in work on any mining property situate in a mineral survey district, it shall forthwith notify the Resident Engineer of that district, and file with him full particulars thereof, and shall also file with him, as soon as it is issued, a copy of every prospectus or statement in lieu of prospectus which is required by the "Companies Act" to be filed with the Registrar of Companies.

(2.) If a corporation makes default in complying with any requirement of this section, it shall be liable, on summary conviction, to a fine not exceeding twenty-five dollars for every day during which the default continues, and every director and every manager of the corporation who knowingly and wilfully authorizes or permits the default shall be liable to the like penalty.

NORTH-WESTERN MINERAL SURVEY DISTRICT (No. 1).

By GEORGE A. CLOTHIER, RESIDENT MINING ENGINEER.

INTRODUCTORY.

The North-western Mineral Survey District (No. 1) is comprised of eight Mining Divisions, as follows: Queen Charlotte, Bella Coola, Skeena, Nass River, Portland Canal, Stikine, Atlin, and Liard, aggregating about one-third of the area of the Province. The total length, north and south, is about 700 miles, of which the northern portion, of about 400 miles, lies east of the Alaska panhandle. The summit of the Coast range of mountains forms its western boundary, at a distance of about 30 miles from tide-water; this portion of the district is therefore accessible only where the Coast range is penetrated by navigable waters. The southern part of the district, of about 300 miles along the Coast, and Coast islands, is very accessible, a most decided advantage for prospecting and operating.

The general geological conditions are simple, dividing the district into three great parallel zones or mineralized belts, extending the full length of the Province. These are the Central Belt, or Coast Range, of granodiorite, flanked by the Eastern Contact Belt on the east and the Western Contact Belt on the west.

The Coast Range or Central Belt may be termed the copper-belt, as exemplified in such mines as the *Outsider* on Portland canal, *Hidden Creek* mine of the Granby Company at Anyox, and *Marble Bay* and *Britannia* farther south. The Western Contact Belt produces mainly copper, but also contains many small gold-quartz veins, exemplified in the mineral-showings of Vancouver island, the Queen Charlottes, and the outer islands on the Alaska coast. The Eastern Contact Belt is characterized by deposits of gold, silver, lead, zinc, and their combinations, as demonstrated in the *Engineer* and Atlin silver-lead mine at Atlin; the *Premier, Dunwell, Porter-Idaho, L. & L.*, and others in the Portland Canal section; the *Dolly Varden, Toric, Esperanza*, and others in the Alice Arm section; the *Bear*, Kalum Lake Mines, and other showings about Kitsumgallum lake; Ootsa lake and Whitesail lake.

The Central Belt, due to its accessibility, has so far been the largest value producer, but from all indications the Eastern Contact Belt will, as transportation is provided, become the greatest mineral-producing zone of the Province.

While the general geology shows these definite characteristic mineral-belts, that of the different sections of each belt offers more complications. These have been investigated by the Geological Survey of Canada and others, and informative reports and maps are now available to any one interested.

The following list will enable the reader to procure publications, etc., pertaining to this district: "The Unuk River Mining Region," by F. E. Wright, Summary Report, 1905, U.S. Geological Survey, Survey Bulletin No. 347, U.S. Geological Survey; "The Atlin District," by D. D. Cairnes, Memoir No. 37; "The Portland Canal District," by R. G. McConnell, Memoir 32; "Salmon River District," by J. J. O'Neill, Summary Report, 1918; "Salmon River District," by S. J. Schofield and Geo. Hanson, Summary Report, Part A, 1920; "Eutsuk Lake District," by R. W. Brock, Summary Report, Part A, 1921; "Upper Kitsault Valley," Alice Arm, by Geo. Hanson, Summary Report, Part A, 1921; "Coast and Islands of British Columbia between Burke and Douglas Channels," by V. Dolmage, Summary Report, Part A, 1921; "Geology and Ore Deposits of Salmon River District, British Columbia," by S. J. Schofield and Geo. Hanson, Memoir 132; "Coast and Islands of British Columbia, between Douglas Channel and the Alaskan Boundary," by V. Dolmage, Summary Report, Part A, 1922; "Reconnaissance between Kitsault River and Skeena River, B.C.," Summary Report, Part A, 1922; "Reconnaissance between the Skeena River and Stewart, B.C.," by Geo. Hanson, Summary Report, Part A, 1923; "Prince Rupert to Burns Lake, B.C.," by Geo. Hanson, Summary Report, Part A, 1924; "Whitesail-Tahtsa Lakes Area, B.C.," by J. R. Marshall, Summary Report, Part A, 1924.

NOTE.—All the above, except the first two, are Geological Survey of Canada reports, procurable from the Department of Mines, Ottawa, Canada, or from the Western office of the Survey, 509 Winch Building, Vancouver, B.C.

ROADS AND TRAILS.

A review of roads and trails phase of the mining industry shows the great and growing importance of this endeavour of the Mines Department to encourage prospecting, development, and eventually production.

On recommendation of the Resident Engineer about thirty appropriations of varying amounts were made for this class of work throughout the district during the past year. The expenditures were mainly in repairs and improvements to trunk trails and roads, to sections giving the greatest promise of developing shipping properties, and assistance to prospectors and small operators for trails.

The improvement of the old road and trail from Telegraph Creek to Dease lake, a distance of 75 miles, into a serviceable truck-road has given that immense area a great impetus, as shown by the activity this season, and the prospects of increasing operations in the future.

Assistance for the completion of the road from Terrace to Kitsumgallum lake assures transportation for that promising mining section.

Extensive repairs and improvements to the Bear River main road from Stewart; a branch road from it to the *Dunwell*, continued thence as a trail to properties farther up Glacier creek; improvements to trails up the North fork of Glacier creek to the *Bayview* and other claims, up Goose creek, American creek, and Bear river beyond the wagon-road; to *Ore Mountain* and other claims, and other smaller trails, have been the means of opening up the Bear river and its tributary valleys.

A road up Marmot river from the beach will, when completed, facilitate ore shipping from that section.

The trail up Georgia river was extended to the head and will give the claim-owners in that area a chance to explore and develop their holdings.

The Dolly Varden Railway from Alice Arm for 17 miles up Kitsault river was put in repair this spring for light traffic, such as hand-cars and gasolene-speeders; without this the valley would be practically inaccessible. Repairs were also made on the main trail from the head of the railway to the head of the valley.

A trail was built up East creek, a tributary of the Kitsault river, to a well-mineralized section of country. The Lime Creek, Roundy Creek, McGrath Mountain, LaRose, East Fork, Reil, and other trails were repaired. Assistance was also granted to trails in the Atlin country.

On the whole, the system of assistance for roads and trails under the provisions of the "Mines Development Act" is working out to very good advantage in this district.

PROSPECTING.

The past year has been one of strenuous prospecting all over the district, not in the sense of the old-time rambling prospector, who figured that the greater distance he travelled the greater the amount of prospecting he had done. Comparatively little new ground has been staked, except, of course, in the Dease Lake country, but apparently every prospector in the district is working on his own claims and the amount of work done is noticeably in excess of the necessary assessment-work. The prospector is becoming a "developer," the result largely of the information obtained from the Annual Reports and the publications and maps of the Geological Survey of Canada.

The following will give the prospector reader some idea of the more accessible sections of the district and how to get there:—

Atlin Section.—Prospecting has been greatly stimulated by the extensive development and equipment of the *Engineer* mine and exploratory work on the adjoining properties, the *Gleaner* and *Kirkland* groups on the lower end of Tagish lake, and the very promising development of the Atlin Silver-Lead Mines property near Atlin.

The section is ideal for prospecting for five or six months during the summer; the mountains are, for the greater part, bare and climatic conditions are perfect. It is reached by boat up the Coast to Skagway, over the White Pass Railroad to Carcross, and from there by lake-boat to the *Engineer*, where there is a post-office named Engineer, and Atlin. Outfitting can be done either at Carcross, which is in the Yukon Territory, or Atlin, B.C. The mineral area is in the Eastern Contact Belt.

Rainy Hollow Section.—This is the drainage-basin of the Klehini river, a tributary of the Chilkat river, which flows into Chilkat inlet, a branch of Lynn canal, just below Haines, Alaska. A large number of claims were staked in this area several years ago, but its inaccessibility prohibited much development, though some very promising showings of gold ore, high-grade copper, and silver-lead ores were discovered. However, last year the Alaskan Government completed an automobile-road from Haines to Pleasant camp on the British Columbia line, a distance of 44 miles, including a fine bridge across the Chilkat at Wells. From Pleasant camp

to Rainy Hollow, all in British Columbia, it is 12 miles over, at one time, a fairly good road, but which through disuse has deteriorated until now it is almost impassable. The renewal of this road to compare with the Alaska road would make this section very accessible and encourage its exploration and development and probably put the *Maid of Erin* on a shipping basis. (*See* 1921 Report.)

Taku River Section.—This is the drainage area of the Taku river, which flows into the head of Taku inlet, which in turn opens up into Stephens passage, about 16 miles south of Juneau, Alaska. The inlet is about 18 miles long to Bullard's ranch at the mouth of the river and from there to the British Columbia boundary is about 10 miles. The river is navigable for small gasolene-boats to about the mouth of the Sloko river, flowing in from the north. I judge that the eastern contact of the Coast Range granites is about 12 miles above the boundary-line.

This section has the characteristic mineralization of the Eastern Contact Belt, but has had a comparatively small amount of prospecting. It is reached by river-boat plying from Juneau to any point on the river up to the Sloko.

Stikine River, Iskut River, and Dease Lake Sections.—The first two sections are in the Eastern Contact Belt, the Dease Lake section being farther east. There has been a considerable amount of prospecting done along the Stikine this year, especially up the Clearwater river, a tributary entering from the north. As the Clearwater is practically on the eastern contact, this area should be a very promising field for prospecting. Reports are that small areas of placer-ground have been found and very promising float-quartz.

The Iskut is a tributary of the Stikine from the south, entering it about 7 miles above the boundary-line. Several groups of claims have been staked and held for years. The river is navigable to the canyon, about 30 miles up, for small gas-boats. Arrangements can be made with the Barrington Transportation Company, plying boats on the Stikine river from Wrangell to Telegraph Creek, for a trip up the Iskut. One requires a good rowboat to get around with after being landed at the canyon and for returning down the river. This section is in the Eastern Contact Belt.

The Dease Lake section had a small stampede to it this spring, particularly to Gold Pan creek, in which placer gold was discovered last fall. A small amount of gold was recovered this summer and considerable prospecting done over a wide area of country, resulting in a reported discovery on Palmer creek, a tributary of the Turnagain river, about 60 miles east of the head of Dease lake. There is an immense country for prospecting, with conditions very favourable now that the completion of the road from Telegraph Creek to Dease lake ensures transportation.

These sections are all easily reached from Wrangell, up the Stikine river to Telegraph Creek, by river-boat operated by the Barrington Transportation Company. Service opens about the middle of May and consists of one or more boats each week, depending on traffic. From Telegraph Creek, where outfitting is done, to Dease lake, about 75 miles, there is motor-truck service. On Dease lake and down Dease river T. Reid, of Wrangell, is operating a gasolene river-boat, offering a good service from Wrangell into the heart of the Liard country, a distance of 300 miles.

Unuk River Section.—From the head of Burroughs bay the Unuk river penetrates the Coast range to the Eastern Contact Belt. There has been enough desultory prospecting done in this section to prove that it is well mineralized and worthy of serious exploration. Its only handicap is transportation. The only means of access at present is by poling and lining up the river, which is extremely dangerous and for experienced men only. (*See* Report, 1920.) It is about 24 miles from tide-water to the boundary-line and 2 or 3 miles from there to the eastern contact, where the mineral-belt is entered.

The building of a trail from the mouth of the river to its head, a distance of approximately 50 miles, would open up the section for prospecting and development.

Portland Canal.—This country has had some very intensive and extensive prospecting this year, mainly on ground that has been staked for years. There is little or no available ground for staking in either the Bear River, Salmon River, or Marmot River valleys on the tide-water slopes. The prospector would have to get pretty well up to the heads of the valleys and over the divide on the Nass slope.

Stewart, reached by Coast-plying boats, three each week during the summer, is the distributing-point of the Portland Canal Mining Division. Each valley has an excellent trunk road, from which radiate pack-horse trails to all tributary valleys and creeks, giving a very efficient system of transportation throughout. There is a serviceable horse-trail over the main Bear River divide and down to Meziadin lake. From the divide down Strohn creek to the lake,

about 14 miles, is a well-mineralized country opened up by a trail up Surprise creek and along the range for 15 miles, which has had practically no prospecting. Some fine showings are reported this year on claims just over the divide. This section is worth attention.

Alice Arm.—This town, at the head of Observatory inlet, has also boat service three times a week during the summer. It is the distributing-point for an extensive mineralized area extending 25 miles up the Kitsault river, the tributary creeks and valleys of the Kitsault, the Illiance River valley, and the country contiguous to Alice arm (the inlet). Here, as in the Stewart country, there is intensive prospecting each summer by the prospectors on claims held for a number of years. Because of the discouraging inactivity in mining in this region for the past two or three years there is more ground available for prospecting and staking. The outlook for the future has, however, materially improved this year and this section is a safe recommendation for prospectors and operators as well.

Kitsumgallum Lake Section.—This, in the Eastern Contact Belt, is reached from Terrace, a town on the Canadian National Railway about 80 miles from Prince Rupert. A serviceable truck-road has been completed this summer from Terrace to the lower end of Kitsumgallum lake, about 20 miles. From here distribution is by way of the lake, though for emergencies there is a trail following the telegraph-line along the east side of the lake, continuing on through the upper valley and across to Aiyansh on the Nass river. From the east side of the lake is a trail up Maroon creek, and from the settlement at the head of the lake, where the Recording Office is, a trail has been built up Maroon mountain to several groups of claims.

This section is becoming more active each year, and is recommended as a very favourable area for prospecting.

Thornhill Mountain Section.—This is across the Skeena river from Terrace, connected by a steel bridge recently erected by the Government. There is an auto-road from Terrace to Lakelse lake, from which a trail serves a number of claims on Thornhill mountain, and farther along another branches off to claims up Williams creek. There are promising showings in this area and considerable prospecting is being done. It is a very likely mineral country and, though rough, is fairly accessible; in all, a section recommended for prospecting.

Canadian National Railway Section.—A great deal of prospecting has been done along the railway, especially before and during construction, when the river-boats were the means of transportation from Prince Rupert to Hazelton. From Prince Rupert to Terrace the formation is schist for about 15 miles from Rupert and the balance Coast Range granodiorite. Nothing of importance has been developed to date along the railway in this district, which extends to Terrace.

Coast and Islands.—The Coast and islands south and west of Prince Rupert, including the Queen Charlottes, certainly offer the most favourable transportation facilities in the district. The miles of waterways make ideal conditions for prospecting, though the rock formations and general geological features are considered not so conducive to mineral-deposition as the eastern side of the Coast range. This section is easily reached to almost any point by the Coast-plying boats. Such properties as the Granby at Anyox, Surf Inlet on Princess Royal island, and Britannia on Howe sound demonstrate the possibilities of the Coast and islands for prospecting.

Miles of "prospecting-trails" will be necessary in all sections of this district to aid and induce the prospector to search farther afield, thus extending the possibilities for investment of capital for development and production.

An innovation in prospecting in this section of the country was the hydroplane reconnaissance made this summer by A. Little, a Detroit mining engineer, to the lower Liard and Frances Lake countries. I have no information as to the results obtained, other than that the flights were successful, demonstrating the feasibility of the use of such machines for prospecting the almost inaccessible interior.

DEVELOPMENT.

This most essential branch of the mining industry has greatly expanded this year. It can be safely stated that there has been more widely spread development throughout this district than ever before. From 1917 to 1925, both inclusive, or a period of nine years, 115 companies have been incorporated, with mining holdings in the district, of which 65 have been organized in the past three years—13 in 1923, 22 in 1924, and 30 in 1925. In 1924 there were 28 operating companies in the district; in 1925 there have been 70, of which 28 are continuing operations through the winter. It seems only reasonable to predict there will be a number of profitable

shipping properties out of this 70 under development. On only a very few properties has there yet been sufficient evidence exposed to conclusively prove their worth. On a great many, however, work is giving important prospective merit to them, but until such time as actual underground work has developed ore of commercial grade and substantial tonnage all these stocks are purely speculative. The ultimate success of many of them will depend on the success in financing.

I suppose it is only natural, at least unavoidable, that out of the flood of companies some will have doubtful merit and methods, and these necessarily bring discredit on those worthy of support. Shun the high-pressure stock-peddlers and investigate the statements of owners and promoters of mining properties having no recognized engineer's report. These smaller companies are the foundation and mainstay of the mining industry and every effort should be made to standardize them by the suppression of those using questionable methods of stock-selling.

In the Atlin section the three properties, the *Engineer*, *Gleaner*, and Atlin Silver-Lead Mines, have been steadily developed all year, with results justifying further work. In placer, upper Spruce creek has been extensively explored and good "pay" proven, but productive work is prohibited by lack of drainage for the excess water. The Discovery Mining and Power Company has installed a pipe-line and all equipment for sluicing on Pine creek.

Several plants have been taken in to the Dease Lake section this year and it is predicted that production in the future will become important. Developments on Gold Pan creek, while not sensational, have been fairly satisfactory. It is the best season this section has had for many years and the prospects are very encouraging.

In the Salmon River (Portland Canal) section seventeen companies have been working and there are several outstanding features for the past year. The intensive and thorough investigation of the ground of the Forty Nine Mining Company, Limited, by the Premier Gold Mining Company apparently did not prove encouraging, as all work was stopped and equipment removed. The development of the *Big Missouri* under the Standard Mining Corporation is reported as very gratifying. Sufficient work will have been done by spring to decide the future policy of the company. The Bush Mines property, under development by the National Silver Mines, Limited, by diamond-drilling, has been taken over on a working basis by the Selukwe Mines. The B.C. Silver Mines has opened up a very satisfactory ore-body and the future of the property is most promising. The Premier Gold Mining Company has had a very successful year and by the doubling of the concentrator and power plant gives every assurance for the future.

The B.C. Bonanza Mines, Limited (*Spider* and *Web* groups), has made small shipments in 1925 and is planning extensive development.

The Indian Mines Corporation made one shipment early in 1925. The property was then closed down for a time, but is again being operated and shipping ore won.

The Northland Mining Company sent out a small shipment for testing purposes. The *Silver Crest* has been developed all year and this work will be continued throughout the winter.

The Salmon River valley altogether gives every reason to expect operations on a large scale, very probably in 1926.

The Bear River section (Portland Canal) has also had a very active year of development, twenty-five companies having been operating during the year. Several companies incorporated last winter did not get any work done and a number have had to curtail operations or close down entirely because of lack of capital. The non-operation of the Dunwell Mines seemed to have caused a feeling of doubt in the public mind and money was therefore hard to raise.

Some very encouraging results were obtained on a number of properties and it is being realized more and more that ample capital is required to put a property on a dividend-paying basis.

The important feature would seem to be the reorganization and resumption of work on the *Dunwell*. A new vein was discovered this spring on the northern portion of the property and sufficient work done on it during the summer to prove it of great importance to the property.

The Glacier Creek Mining Company will proceed with diamond-drilling again since power is available from the *Dunwell*. The *Lakeview* was closed for a time, but development has been resumed. On the *Emperor* the vein has been cut in the long crosscut tunnel and it looks as if a tonnage of milling-grade ore would be developed.

The *L. & L.* has been further developed and some ore been shipped therefrom. The Albany Mining Company, Limited, is going ahead with development-work on the *Albany*. The Mimico

Mining Company was organized to operate the *Mimico*, but no work was done in 1925. The Phoenix Silver Mines Company had a few men on exploratory work during the summer of 1925. The discovery on the *Dunwell* has made the adjoining ground of the Victoria Mines, Limited, worth extensive exploration. The Ore Mountain Mining Company properties above Bitter creek, the *Ruby Silver*, the *Terminus*, *Rufus*, *Argenta*, *George Copper*, and *Red Top* have all been explored more or less during the year. On the *Independence* a lot of work has been done, with results that warrant future exploration, while farther down the west side of the valley the *United Empire* and *Bayview* show up very well.

On the Marmot river three companies have been working. The Porter-Idaho Mining Company has been shipping and developing; the Marmot Metals Company has been exploring the *Montana*, and the Sterling Silver-Lead Mines, Limited, some claims up the North fork.

Owners of claims at the head of Bull Dog creek and Georgia river have been working on them all summer.

At Alice arm only three companies have operated to any extent this year. The Kitsault Mining and Development Company has done considerable work on the *Matilda* and other groups at the head of the Kitsault river. The Alice Arm-LaRose Mining Company has driven a crosscut tunnel. The *Esperanza* has shipped considerable ore and other properties have been developed by the owners.

The outstanding feature is the opening-up of the *Toric* by the Homestake Consolidated Mining and Development Company.

In the Kitsumgallum Lake section active development of the *Bear*, *Black Wolf*, and *Glen* have been carried on by the Hopper-Davis Syndicate. The Kalum Lake Mines Company has been drifting on the vein from the bottom of the shaft.

On Thornhill mountain, across from Terrace, development-work on several claims is being done by O. P. Brown.

Down the Coast the Belmont-Surf Inlet Mines, Limited, has worked steadily all year. The Khutze River Mines, Limited, did some preliminary work on the *Western Copper* at the head of Khutze inlet. The Paisley Point Mines, Limited, has taken over the old Drum Lummon property and commenced exploratory work.

It will therefore be seen that development has been very active all over the district and with the excellent start made in 1925 greater progress seems inevitable.

PRODUCTION.

The following is a list of the shipping properties in District No. 1 and their outputs for 1925:—

Name.	Ore mined.	Gold.	Silver.	Copper.	Lead.	Zinc.
	Tons.	Oz.	Oz.	Lb.	Lb.	Lb.
Engineer	1,700	1,867	888	.....	.....	.....
Cherokee	10	11	1,898	.....	1,149	.....
Esperanza	156	11	8,086	.....	1,170	.....
Golskeish	5,264	473	2,746	.....	.....	.....
Hidden Creek and Outsider	1,163,258	6,997	377,910	39,510,163	.....	.....
Wolf	17	3	2,212	.....	583	.....
Belmont	78,640	35,086	21,273	677,422	.....	.....
Goldie	2	.....	82	.....	648	270
Bayview	9	.....	1,462	.....	2,673	2,903
Dandy	7	4	215	.....	4,915	1,499
Indian	30	1	371	.....	17,010	8,325
Porter-Idaho	177	13	21,735	.....	27,867	.....
Premier	168,557	118,448	2,363,556	.....	785,330	.....
Silverado	2	.....	320	40	.....	.....
Spider	7	3	2,480	.....	1,086	1,415
Silver Crest	1	.....	257	.....	.....	.....
Terminus	6	.....	1,568	.....	308	2,835
Totals, 1925	1,417,843	162,917	2,807,059	40,187,625	842,739	17,247
Totals, 1924	1,297,268	180,463	3,500,779	36,618,688	508,711	.....
Increase	120,575	.....	.....	3,568,937	334,028	17,247
Decrease	.....	17,546	693,720	.....	.....	.....

The above table shows a number of new shipping properties, the majority of which have sent out a small shipment for testing purposes, and therefore may not be considered as permanent producers, with the exception of the Engineer Gold Mines, Limited.

Tonnage.—The total of 1,417,843 tons shows an increase of 120,575 tons, or 9.25 per cent. over last year, and is the greatest tonnage ever mined in one year in the district. The Granby and Premier Companies are the two chief contributors to the increase.

Values.—The total values of gold (exclusive of placer), silver, copper, and lead, of a little over $11,000,000, are greater than last year's values by about $260,000. It is the fourth successive year that No. 1 District's output has exceeded $10,000,000.

Gold.—The placer-gold yield of the Stikine and Liard Divisions this year was $8,200, against $3,325 last year. Of this, $7,656 was cleaned up on Gold Pan creek. The Atlin placer-gold output of $49,229 is less than last year. The total placer production is therefore $57,499.

The prospects of placer gold increasing substantially in the next year are very bright. A better yield can be expected from the Dease Lake country next year. The operating of the newly installed plant on Pine creek, Atlin, gives every promise of a fair yield, at least for the first year, after which it will in all probability increase to a very substantial figure.

Lode gold shows a decrease of 17,546 oz. from last year, due to the lesser production of the Premier by about 20,000 oz. The Granby and Surf Inlet increased a little and the *Engineer* mine came in with 1,867 oz. as a starter. An increase is looked for next year because of the greater milling capacity of the Premier and probable production from the *Engineer*, though the depletion of the Belmont-Surf Inlet may offset these.

Silver.—There has been the rather substantial decrease of 693,720 oz. silver or about 20 per cent. from last year. Of this, the Premier's decrease is 652,000 oz., the Granby's 34,000 oz., *Porter-Idaho's* 11,000 oz., and *Esperanza's* 9,000 oz. However, the Premier may with increased milling capacity make up the deficiency. The B.C. Silver and *Dunwell* will start shipping the first of 1926, which should materially add to the output. The *Torio* may come in with a substantial production in 1926, depending on the completion and operation of the concentrator, for which the foundation is laid. *Porter-Idaho, L. & L., La Rose,* and possibly the *Esperanza* and *Bayview* may contribute in a smaller way. It is not likely that the Atlin Silver-Lead Mines will ship to any extent in 1926, as all efforts will be confined to development-work. Everything considered, the future for silver in this district looks distinctly rosy.

Copper.—The old "stand-by," the Granby Consolidated, made a record production of 39,510,163 lb. this year, an increase of 3,517,437 lb. or about 9.8 per cent. over last year. The contemplated increase in milling capacity and installation of a sintering plant would indicate the maintenance of this production under normal operating conditions. There do not seem to be any prospective copper-producers at present in this district.

Lead.—The output of lead in the district has not been taken very seriously, yet this year it has almost reached 1,000,000 lb., due mainly to the increased lead content in the Premier ore. Its volume will increase as the smaller shippers increase, there being a small percentage of lead in all the gold-silver ores throughout the district.

Zinc.—There is, as a rule, a higher percentage of zinc than lead and this metal will therefore become increasingly important as shippers are developed. The McGrath Mountain area at Alice arm has zinc-showings, indicating important deposits, and is therefore worth investigation.

REVIEW BY MINING DIVISIONS.

The district will be reviewed under the main headings of the Mining Divisions, subdivided into sections as follows:—

Queen Charlotte Mining Division—Graham Island section; Moresby Island section.

Bella Coola Mining Division.

Skeena Mining Division—Coast section; Canadian National Railway section; Kitsumgallum Valley section; Lakelse Valley section.

Nass River Mining Division—Observatory Inlet section; Hastings Arm section; Alice Arm (proper) section; Kitsault River section; Illiance River section.

Portland Canal Mining Division—Portland Canal (proper) section; Georgia River section; Marmot River section; Bear River section; Meziadin Lake section; Salmon River section; Unuk River section.

Stikine Mining Division—Stikine River section; Iskut River section.

Liard Mining Divison—Dease Lake section.
Atlin Mining Division—Taku Inlet section; Rainy Hollow section; Tagish Lake section; Atlin Lake section.

QUEEN CHARLOTTE MINING DIVISION.

There has been little apparent mining activity on the islands this year, though an appreciable amount of prospecting and development by way of assessments have been done.

GRAHAM ISLAND SECTION.

The investigations of the gold-bearing black sands along the north-east coast of this island have been continued this year by Charles T. Cabrera for Toronto interests. He states that a small testing plant, consisting of six 6- by 4-foot leaching-tanks, two solution-tanks, one sump-tank, two 8-compartment zinc boxes, pumping-engine, and laboratory, was completed early in July. Seventy-two tons of sand from various pits on the property was screened, and the screenings, 48 tons, put through the testing plant. From this amount the recovery of gold was $76, or $1.06 a ton for the total of 72 tons. The cost of supplies—i.e., cyanide, soda, and zinc—was 9½ cents a ton of sand treated. The operating costs were not stated.

Following these tests, Mr. Tough, interested with Carson and Company, of Toronto, in financing this preliminary work, visited the property. Samples of the sands were taken East by him and submitted to Thomas Heys & Sons, analytical chemists and assayers, Toronto, for assays. A composite sample, composed of equal parts of twelve samples, assaying $2.05 gold to the ton was tested by amalgamation and cyanidation, resulting in the recovery of about 81 per cent. of the gold content of the sands; of the balance, 20 cents a ton was lost in the tailings and 20 cents a ton in combination with the magnetite.

The work this year has been financed by the Tretheway-Tough Mining Syndicate, an exploration and development syndicate, with its head office in Toronto, handled by Carson and Company. The prospectus issued states, in connection with the Graham Island black sands, that "the property has been reported on by Chas. T. Cabrera, M.E., who estimates the contents at over 5,000,000 cubic yards, from which a net profit of $1.50 a yard can reasonably be expected. . . ."

From my observations and information the above statements are not in accordance with the facts and are, to say the least, entirely misleading. The property consists of three leases, aggregating 4,500 feet along the beach. The depth of workable gold-bearing sands will average not over 12 feet, since it must be above high tide, and the average width of the workable beach will not be over 200 feet, which would give considerably less than 5,000,000 cubic yards. Judging from the innumerable samples that have been taken of these beach sands, it is a very safe statement that they will average over the area of this property considerably less than $1 a yard, and certainly have no possibility of yielding a net profit of $1.50 a yard. In fact, it has not yet been conclusively proven that there is any profit in them.

South Easter Group.

(*See* 1918 Report.) This group consists of seven claims very favourably situated near Skidegate and is owned by J. McLellan, of Queen Charlotte, and associates. The showing is an 8- to 10-foot wide pyritized quartz vein carrying gold values, very high grade in places. A shaft was sunk 100 feet in 1918, since which time only some surface work has been done. At the 50-foot level drifts were run 50 feet west and 75 feet east; at the 100-foot level, 100 feet to the west and 250 feet to the east. The east drift from the 50-foot level shows a fair ore-shoot, but the lower workings have exposed only a broken-up, mud-filled vein. The values and free-milling nature of the ore would seem to justify further development. The property was equipped with a good camp, compressor, and machines.

MORESBY ISLAND SECTION.

Beyond the usual necessary assessments around Lockeport and Jedway and a little prospecting at the head of Sewell inlet there is little to report. There are several groups and claims that I think would bear investigation: The *Blue Mule* on the west coast of Moresby island, which carries encouraging values in free gold; the *Swede* at Lockeport, an immense body of low-grade copper ore, in which small platinum values have been obtained; the *Copper Queen* at Jedway, on which considerable work was done years ago, and on which a large body of low-grade copper ore

has since been discovered and prospected to some extent by stripping and open-cutting; the *Hope* at the head of Houston inlet, where assessment-work has exposed a 6-foot vein of 3.5-per-cent. copper ore; the Ikeda Mines on Ikeda bay, from which a large tonnage of high-grade ore was shipped during several years and on which are a number of showings of low-grade ore which might develop into a milling tonnage; the *Thunder* at Collison bay, owned by Ike Thompson, of Jedway, which shows a wide vein of magnetite carrying a fair copper content; the *Meal Ticket*, adjoining the *Thunder*, which has a large vein of quartz exposed along the surface, well mineralized with pyrrhotite and chalcopyrite; the *Copper Island* showings, belonging to A. Heino, of Lockeport.

BELLA COOLA MINING DIVISION.

With the exception of some assessment-work and prospecting on Tesla mountain, there was practically no mining in this Division in 1925. This area is situated about 35 miles from Kimsquit, 6 or 7 miles south of Eutsuk lake, and apparently just in the Eastern Contact Belt. The present trail is up the Bella Coola river, then northerly, but is a long route of three or four days' travel. It is proposed to put in a prospector's trail from Kimsquit, following the Dean river for a distance, then striking north to the mineral-zone, a distance estimated at 35 miles, which would be a great advantage over the present roundabout route. Some very promising ore specimens have been brought out by prospectors interested in that section.

SKEENA MINING DIVISION.

There was decidedly greater activity in mining in this Division during 1925, both on the Coast and islands and in the Terrace country. While the depletion of the *Surf Inlet* mine, which has been the only important shipper in the Division, must be expected, there are a number of properties under development that give promise of becoming shippers.

Belmont-Surf Inlet Mines, Ltd.

(*See* previous Annual Reports.) This company's properties lie on Princess Royal island, about 7 miles from the head of Surf inlet. Production was started in 1916 and has been continuous to date, amounting to nearly seven and a half million dollars in gold, silver, and copper. The dividends paid this year were $312,500 and to date $1,000,000. Operations now consist of cleaning up the remaining ore in the mine. This year 78,640 tons was mined and milled, producing 8,100 tons of concentrates, which yielded 35,086 oz. gold, 21,273 oz. silver, and 677,422 lb. copper. The efforts of the company to procure another property in the Province, to which the organization and plant at Surf inlet can be transferred, have not as yet been successful.

Fred Penn is superintendent in charge at the property and E. Hawkins is auditor. P. W. Racey, former mine superintendent, has been transferred to the parent company, the Tonopah Belmont Development Company.

Western Copper Group.

This group consists of forty-nine Crown-granted mineral claims, situated at the head of Khutze inlet, and owned by Messrs. Martin and Shannon, of Vancouver. A very considerable amount of work was done on the property prior to 1910, consisting of open-cuts along the vein, and tunnels. A tramway was built from the foot of the hill to tide-water at the head of the inlet, a distance of about 5 miles. Since then it has lain dormant until this spring, when it was bonded by E. W. Scully and later taken over on agreement by the Khutze River Mines, Limited, capitalized for $10,000, of 1,000 shares, with head office in Vancouver.

Under Mr. Scully's supervision the camp at the beach was reconditioned and the old tram-line from the beach repaired sufficiently for the transportation of supplies. The trail from the valley to the showings on the mountain was put in repair. Some work was also done on a mineral-showing along the tram-line.

I was unable to get down the Coast until late in the fall, and found the upper portion of the property covered with snow, so necessarily postponed examination until next spring as early as conditions will permit.

Pink Rose Group.

(*See* Report, 1922, *Bolton* group.) This group is situated about 2 miles up from the beach on the north side of the head of Klekane inlet, which opens from Graham reach about opposite Butedale. The group, composed of seven mineral claims—*Pink Rose*, *Last Chance*, *Bonanza*, *Copper Cliff*, *New Crown*, *Key*, and *Bella*—is owned by J. McLeod, F. A. Nicol, and W. H. Mason, of Vancouver.

The deposit is of the contact-metamorphic type, formed by the replacement of limestone along and near its contact with the Coast Range granodiorite. The work done is above the cabin, which is at 1,750 feet elevation, and consists of an open-cut and, 30 feet below this, a tunnel. The open-cut exposes a width of from 12 to 15 feet of lenses and bunches of epidote, hornblende, garnetite, etc., all more or less mineralized with chalcocite and bornite. Further work was done just above the cabin on a quartz vein about 6 feet in width, showing some chalcopyrite, and apparently paralleling the exposed vein above. Some work has also been done on what is considered the extension of the upper vein down the hill, above the road. The owners were working on the property all summer.

Paisley Point Mines, Ltd. (formerly Drum Lummon Mines, Ltd.).

This company, organized in March of this year with a capitalization of $250,000, of 1,000,000 shares, acquired the thirteen Crown-granted claims comprising the holdings of the Drum Lummon Mines, Limited, which went into bankruptcy in November, 1924. The property has been described from year to year in these reports, both as to underground work and surface equipment. The present company is in a good position to go ahead with much-needed development-work.

Though the vein has been drifted on for about 400 feet, encountering more or less ore in two areas, there has been little exploratory work done above or below this drift, except in stoping, from which about 1,000 tons of ore was mined, where 100 tons judiciously stoped would probably have produced the same amount of values. The property is therefore at the stage where all the preliminary dead-work has been done, all necessary equipment installed, and consequently where subsequent well-advised exploratory work should show conclusive results. From the results of underground work so far and the nature of the vein and mineralization, I think extensive development is fully warranted.

Mineral Hill Group.

The following claims: *Mineral Hill No. 1*, *Mineral Hill No. 2*, *Mineral Hill No. 3*, and *Summit*, comprise the group. They are owned by Chas. E. Moore, of Kitimat, and situated on Iron mountain, about 8 miles up the valley from the head of Kitimat arm. The owner has held them for several years, doing considerable development each year. The claims were surveyed this year.

Rowe Claims.

This property consists of three claims—*Starboard Watch*, *Canadian Girl*, and *Rio Costello*—situated on Pitt island, on the west slope of Noble mountain, about 1½ miles from the beach at 950 feet elevation, and about 3 miles south of Captains cove. They were staked in September by John Costello and Charles O. Rowe, of Prince Rupert.

The showing consists of a quartz vein lying in a shear-zone in a granodiorite formation. The vein is well defined, 4 feet to 6 feet wide where best exposed on the surface, and traceable for 200 or 300 feet. It strikes along the hill about north and south and dips easterly into the hill at apparently from 40° to 50°. A short tunnel just started is all in quartz, heavily pyritized in bunches and parallel seams and more or less disseminated with pyrite throughout. A few pieces of sulphides from different places gave $18 a ton in gold. The owners are building a cabin just below the showing and will open up the vein along the hill. There is a fair foot-trail from the beach.

Patterson Group.

(*See* previous reports.) This group of five claims, owned by Frank Patterson, of Refuge Bay, has been under lease during the season, but no ore was shipped in 1925. The owner later did some work and succeeded in picking up a very promising ore-showing at a lower point on the hill than anything found yet. He plans to ship ore this winter.

Wright Group.

There are four claims in this group, situated south of and adjoining the Patterson group, as follows: *I.X.L.*, *Nabob*, *I.X.L. Fraction*, and *Klim*, owned by A. E. Wright, of Prince Rupert. The showings are parallel quartz veins in granite formation, varying in width from 12 to 14 inches. This year a cabin was built and about 80 feet of open-cutting and stripping was done on two or three veins, exposing short lenses of pyritized quartz carrying good values in gold, which is all contained in the iron sulphide. The veins must be developed separately, being too far apart to be worked from a common tunnel. With the opening-up of a number of these veins the property can probably be made to pay in a small way.

CANADIAN NATIONAL RAILWAY SECTION.

This section includes all the country bordering the railway and Skeena river from Prince Rupert to Terrace, a distance of 95 miles. There has been more or less prospecting and staking along the river for many years, but the formation, consisting of crystalline schists for about 20 miles from Prince Rupert and the granodiorite of the Coast range for the remainder of the distance, is apparently not a kindly one for commercial ore-bodies, as nothing of importance has developed.

The *Autumn* group at Amesbury, owned by S. Alger, is the only property on which yearly work is being done.

KITSUMGALLUM VALLEY SECTION.

This area extends from Terrace, on the Canadian National Railway, north to the Nass river, a distance of about 54 miles.* On the eastern side of the valley a spur of the granite range extends from Terrace to about half-way up Kitsumgallum lake. On the western side is a belt of volcanics, traversed by the Zymagotitz river, changing to argillites, quartzites, and tuffs south of Kitsumgallum lake, and extending along its western side and on through to the Nass river and beyond, along the eastern border of the Coast range. The same formation is north of the granite on the east side of the lake. On either side of Cedar river, which flows into the north end of the lake, there is an area up to 6 to 8 miles wide of argillites, sandstones, and shales. There is therefore a very likely prospecting country all the way through from the south end of the lake to the Nass river and beyond, in the Eastern Contact Belt.

The road has been completed from Terrace to the foot of the lake, making that section very accessible. This year has been a very active one in the region around the lake, and the section in general is rapidly coming to the front.

Oakwood Group. This group is comprised of the mineral claims *Oakwood, Outwood, Ladas, Elsie, Loving Cup,* and *Silver Mug,* owned by E. Hamer, of Terrace. The claims are situated just north-east of Terrace. The rock formation is granite, in which are small segregated veins of quartz, in which values are claimed to have been found by the owner. An appreciable amount of work has been done by the owner in open-cutting at different places where the quartz segregations appear on the surface, but the results have not been at all encouraging.

Black Bear Group. This group now consists of the two original claims, *Black Bear* and *Cub,* to which have been added the *Duplex No. 1* and *Duplex No. 2.* The Chiro Mining Company had an option on the *Bear* and *Cub* claims, which was taken over by the Hopper-Davis Syndicate, who added the *Duplex No. 1* and *Duplex No. 2* for assessment and operating purposes.

The showing on this group is a quartz vein up to 4 feet in width, lying in a slaty, schistose rock, and mineralized with galena, zinc-blende, chalcopyrite, and pyrite, in places carrying good gold values. The vein has been traced by open-cutting and trenching for 600 to 700 feet on this property, and both ways from this for a total length of over a mile.

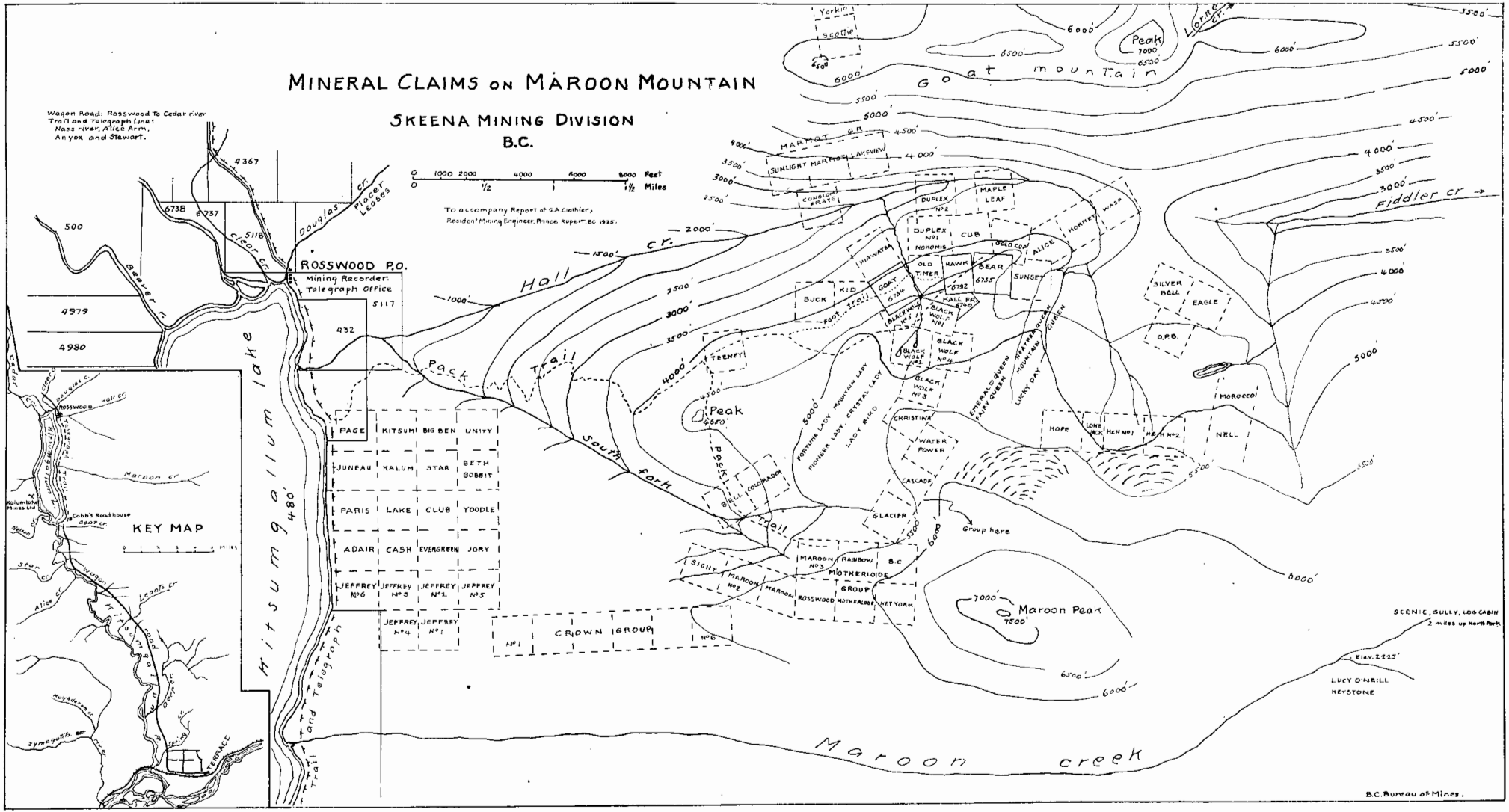
Previous to this year the greatest depth obtained on the vein below the surface was from 15 to 20 feet. On being taken over by the Hopper-Davis Syndicate it was decided to drive a crosscut tunnel, which would obtain about 100 feet depth. This work was completed late in 1925, resulting in a tunnel 143 feet in length, from which a drift was run 20 feet east on the vein. The vein was found to be somewhat more perpendicular than on the surface, about 2 feet wide and well mineralized with a good grade of milling-ore.

It is the intention to drift both ways on the vein in the spring to determine whether a small concentrating plant is warranted. The work has been under the supervision of J. Hoar.

Black Wolf Mining Co. This is an extra-provincial company, comprised of Seattle and Eastern people, which has bonded the *Black Wolf* group, and is controlled by the Hopper-Davis Syndicate. The *Black Wolf* group is composed of the *Black Wolf Nos. 1, 2, 3, 4,* and *5,* staked and owned by Oscar Gendron, Oscar Olander, Paul Brodin, and John Couture, of Terrace. The claims adjoin the *Black Bear* group on the east and no doubt contain the extension of the *Black Bear* vein.

Several open-cuts have been put in on the vein, showing it to be about 14 inches wide on an average, in places carrying 8 inches of galena, zinc-blende, pyrite, and traces of chalcopyrite,

* *See* Report by G. Hanson, Summary Report, Geological Survey, Canada, 1923, Part A.


MINERAL CLAIMS ON MAROON MOUNTAIN
SKEENA MINING DIVISION
B.C.
Wagon Road: Rosswood To Cedar river
Trail and Telegraph Line:
Nass river, Alice Arm,
Anyox and Stewart.
0 1000 2000 4000 6000 8000 Feet
0 1/2 1 1 1/2 Miles
To accompany Report of G.A. Clothier,
Resident Mining Engineer, Prince Rupert, BC 1925.
ROSSWOOD P.O.
Mining Recorder.
Telegraph Office
Hall cr.
Pack Trail
South fork
Goat mountain
Fiddler cr
Maroon creek
Maroon Peak
Peak
Hitsumgallum lake
Trail and Telegraph
Douglas cr.
Placer Leases
Clear cr.
Beaver r.
Lorne cr.
Yorkie
Scottie
MARMOT CR
SUNLIGHT MARMOT LAKEVIEW
CONGLOM PRATE
DUPLEX No2
MAPLE LEAF
DUPLEX No1
CUB
NOKOMIS
HIAWATHA
OLD TIMER
HAWK
BEAR
GOLD CUP
ALICE
HORNET
WASP
SUNSET
BUCK
KID
GOAT
HALL FR.
BLACK WOLF No1
BLACK WOLF No2
BLACK WOLF No3
BLACK WOLF No4
BLACK WOLF No5
TEENEY
FORTUNE LADY
MOUNTAIN LADY
PIONEER LADY
CRYSTAL LADY
LADY BIRD
CHRISTINA
WATER POWER
CASCADE
GLACIER
EMERALD QUEEN
FAIRY QUEEN
HEATHER QUEEN
MOUNTAIN QUEEN
LUCKY DAY
HOPE
LONE JACK
HCH No1
HCH No2
NELL
MOROCCO
SILVER BELL
EAGLE
O.P.B.
BELL
COLORADO
SIGHT
MAROON No2
MAROON No3
RAINBOW
B.C
MOTHERLOIDE GROUP
ROSSWOOD
MOTHERLOIDE
NET YORK
Group here
PAGE
KITSUM
BIG BEN
UNITY
JUNEAU
KALUM
STAR
BETH BOBBIT
PARIS
LAKE
CLUB
YOODLE
ADAIR
CASH
EVERGREEN
JORY
JEFFREY No6
JEFFREY No3
JEFFREY No2
JEFFREY No5
JEFFREY No4
JEFFREY No1
No1
CROWN GROUP
No6
SCENIC, GULLY, LOG CABIN
2 miles up North Fork
Elev. 2225'
LUCY O'NEILL
KEYSTONE
KEY MAP
Miles
Cobb's Roadhouse
Goat cr.
Maroon cr
Kalum Lake Mines Ltd
Wagon road
Leante cr
Alice cr
Star cr
Zymagotitz cr
TERRACE
B.C. Bureau of Mines.

carrying high values in silver and gold. The main work this year was the driving of a 77-foot drift. Three hundred sacks of ore was taken from this work and upper cuts and packed down to Kitsumgallum lake.

This property, in conjunction with the *Black Bear*, gives every reason to believe that a sufficient tonnage of first-class milling-ore will be developed to justify the erection of a concentrator.

Glen No. 1. This claim is situated on the Little Beaver river, which flows into the Beaver river, which in turn empties into the head of Kitsumgallum lake. There is a foot-trail to the property, starting from the west side of the head of the lake, from which point it is about 3 miles across to Little Beaver, which is crossed by a bridge at the lower end of the canyon, the trail then following up the west side of Little Beaver 6 or 7 miles to the foot of the hill at an elevation of 1,150 feet or 650 feet above the lake-level. From the foot of the hill up to the showings is a 1,600-foot rise. There will be no difficulty in building a first-class trail all the way when developments warrant.

The general rock formation is a coarse-grained, grey, tuffaceous rock. The vein has been stripped and open-cut on this claim for about 175 feet, showing it to be from a few inches to 18 inches in width of mineralized quartz. The mineralization varies from a few crystals of iron scattered through the quartz to solid massive arsenopyrite, sphalerite, and a fair percentage of galena.

Four open-cuts have been put in across the vein, the first, at 160 feet south of the north end line of the claim, showing 16 inches of slightly mineralized quartz. Forty-five feet north of this, toward the *Fisher* group, adjoining on the north, another cut discloses about the same width and mineralization; 10 feet farther north another cut shows 16 inches of solid sulphides, mainly arsenopyrite, carrying zinc-blende and some galena. Another small cut about 75 feet farther along the vein shows about a foot of sparingly mineralized quartz. Altogether the vein is very persistent and apparently improves in width towards the south.

A little work was done in the late fall and I understand a camp will be established in the spring. This property and the *Fisher* group, adjoining on the north, and the *Brian Boru* group, adjoining on the south, are all under option to the Hopper-Davis Syndicate and will be thoroughly explored.

Fisher Group. This group, owned by W. Treston and Dave Wilson, of Terrace, is comprised of four claims—*Fisher*, *Lynx*, *Marten*, and *Wolf*. They are situated adjoining the *Glen No. 1* on the north, and as the stripping and open-cutting of the vein is continued on this group, the description of the *Glen No. 1* preceding will apply here.

Brian Boru Group. This group, consisting of *Brian Boru*, *Rago*, *Mike*, and *Pat* claims, adjoins the *Glen No. 1* on the south, and as it contains the same vein the description of the *Glen No. 1* will also apply. These claims are also owned by W. Treston and associates and I understand are under option to the Hopper-Davis Syndicate.

Kalum Lake Mines, Ltd. This company was incorporated in 1924 with a capitalization of $75,000, of 75,000 shares, with its registered office at Terrace. The property, known as the *Portland* group, comprises the following claims: *Portland*, *North Portland*, *Portland Heights*, *West Portland*, *East Portland*, and *Portland Fraction*. They are situated on the south-western shore of Kitsumgallum lake and were staked by C. A. Smith, of Terrace, who has very creditably supervised subsequent operations. The rock formation is igneous, intruded by granodiorite and basic dykes, and argillite farther to the west. The work done up to the end of September, 1925, when operations stopped, consists of a shaft sunk 60 feet at the edge of the lake, from the bottom of which a drift was run 210 feet westerly on the vein. The vein is shown to be a foot or more of quartz consistently mineralized with pyrite, a little chalcopyrite, and traces of grey copper. The sulphides assay over $100 a ton in gold and silver, mainly gold, of which about 90 per cent. is free.

The drift so far has been in igneous rock, in which the vein is well defined, but is cut up so much by crossing dykes that the results of the work, so far as ore is concerned, has been rather disappointing. What effect the argillite formation will have on the vein and values, supposing the argillite extends downward to the drift-level and is not an overlying formation, is conjectural, but worth demonstrating.

Other properties in this section on which assessments have been done are:—

Motherlode group (1923), situated on Maroon mountain. The upper tunnel has been driven 125 feet and 150 feet vertically below another tunnel is in 140 feet.

Log Cabin group (see *Scenic* group, 1922), situated on Maroon creek, Maroon mountain, and owned by J. Garland, who claims to have opened up a large showing of copper ore.

Blue Grouse and *Hunter* groups (1918). These are adjoining groups, situated about 18 miles up Cedar river from the head of Kitsumgallum lake. The showings are silver-lead. The owners are Oscar Olander, of Terrace, and associates.

Silver Coin group (1921), situated on the telegraph-line trail about 15 miles north of the head of Kitsumgallum lake. Shows high silver values in steel galena and grey copper. Owned by J. Couture, O. Gendron, and partners and recently optioned to the Hopper-Davis Syndicate.

Marmot group (*Sunlight* group, 1920), situated on the east side of Goat mountain. A. Egan, owner.

Juneau group (*Treadwell No. 2* group, 1918), situated on the east side of Kitsumgallum lake. J. Belway, owner.

Lucy O'Neil (1921), situated on Maroon creek. Owner, Charles Purdy.

Jennie Jiggs and *Florence*, situated on the east side of Kitsumgallum lake. Owned by Geo. Cobb, Terrace.

Lady group, situated on Maroon mountain. Owned by L. Wesden and partners.

Queen and *Zinc* group, situated north-east of Maroon mountain. Owned by H. H. Jones and partners.

Placer.—D. Shaw, operating placer claims on Douglas creek, completed a trail up the creek 2 miles, built a good cabin, and put in several hundred feet of flume and sluice-boxes. He had the misfortune of having his flume-line and sluices taken out by a freshet before any appreciable sluicing had been done, but will replace them.

LAKELSE VALLEY SECTION.

This section includes both sides of the Lakelse valley, across the Skeena river from Terrace. However, the only area so far prospected to any extent is Thornhill mountain, which is very accessible by way of the new steel bridge across the Skeena river, about a mile east of Terrace, and the wagon-road to Lakelse lake.

St. Paul Group. There are four claims in this group—*St. Paul*, *Ptarmigan*, *Marie*, and *Sadie*—situated on the summit of Thornhill mountain at 5,000 feet elevation and down both the Lakelse and Zymoetz slopes. The group is owned by Michaud Bros., of Terrace, and has been reported on before as the *Ptarmigan* group. Some important prospecting has been done on it during the last two seasons. The predominating rock formation is greenstone, in which are wide belts of quartz porphyry, which are evidently the cause of so much mineralization.

The main showing is a big quartz vein, striking N. 80° E. and dipping at 35° N., traceable up the Lakelse slope, over the summit, and down the Zymoetz River side for nearly the full length of the *St. Paul* claim. It lies on the hanging-wall of a broad, limonitized quartz-porphyry belt easily followed on the surface from its yellowish colour. The hanging-wall of the vein is greenstone. The vein is from 10 to 14 feet wide, as most clearly shown in an open-cut on the summit at 4,500 feet elevation. Apparently there have been two distinct depositions of quartz, as the upper 6 to 8 feet on the hanging-wall is a white watery-looking quartz with little mineralization, while the foot-wall side, about the same width, is rusty-coloured and fairly well mineralized with pyrite, arsenopyrite, chalcopyrite and traces of galena, and zinc-blende in streaks paralleling the walls. The heavily pyritized quartz assays up to $80 in gold to the ton and the mixed sulphides up to $60 a ton in all values.

This is the only cut across the vein. Several hundred feet down the Zymoetz River slope, at 4,300 feet elevation, what was intended for a crosscut tunnel was started in the porphyry to cut the vein. The strike of the tunnel is N. 85° W., or 15° from being parallel with the vein. I advised stripping along the surface from the mouth of the tunnel until the vein was found on the hanging-wall of the porphyry and commencing work there. I believe this vein is well worth exploration by drifting from either side of the hill. On the Lakelse Valley side a drift would have to be started on the *Society Girl* ground, which adjoins the *St. Paul* on the west.

On the lower end of the *St. Paul* claim, about 300 feet south of and parallel to the main vein and at 4,100 feet elevation, an open-cut and short tunnel have been driven on a quartz vein from 6 inches to 2 feet wide, mineralized with pyrite, chalcopyrite, and traces of galena and zinc-blende.

Along the walls and in the seams in the quartz are spots of hæmatite in which native gold can be seen. In the quartz are small nodules of scheelite. The walls appear to be a granite porphyry. This vein warrants further work.

Farther north on the *Ptarmigan* claim of this group there is a similar belt of porphyry to that along the main vein, apparently a couple of hundred feet wide, in which occur small veinlets of quartz carrying high silver values in grey copper. One showing in a shear in the porphyry shows heavy oxidation across 8 feet, sparsely mineralized with grey copper, chalcopyrite, and galena, carrying some values in silver, but it has never been opened up. Altogether I think this a property worthy of investigation.

A new cabin was built in 1925 near a small lake at 3,800 feet elevation on the Zymoetz River slope.

Society Girl Group. This group contains three claims—*Society Girl*, *Don*, and *Silver Bell*—and adjoins the *St. Paul* on the west. The group is owned by Dan Mason and W. Bell, of Terrace. The extension of the *St. Paul* vein has been traced by several open-cuts, but no mineralization such as showing in the cut on the *St. Paul* has yet been disclosed, though the watery quartz found on the hanging-wall has been broken into. The cuts may be too high to cut the foot-wall or mineralized portion of the vein.

Beaver Group. (*See* 1918 Annual Report, *Lucky Seven* group). The *Beaver*, *Golden Lady*, *Star*, and *Fisher* claims, owned by William Dahl, form this group. There are a number of small veins on the claims that have been explored to some extent. One flat quartz vein yielded by mortaring and panning several hundred dollars in free gold. A specimen piece from this showing was sold for $200.

The most promising showing is a quartz vein on the *Beaver*, traced up a small creek by open-cuts in several places. It is from 2 to 4 feet wide, with average values stated at $10 in gold to the ton.

O. P. Brown took an option on the property a year ago and organized a company in Seattle, named the Northern Mining and Development Company, to undertake its development, which was started late in 1925. He is equipping the property with a small concentrating plant and tramway in the spring.

Golden Nib. This claim is also owned by Wm. Dahl and is now under option to O. P. Brown. It is situated on the lower slope of Thornhill mountain, about ten minutes' walk from the 7-Mile post on the Lakelse road. The elevation of the tunnel is at 1,050 feet, about 350 feet above the wagon-road.

A tunnel has been driven 90 feet, following a quartz vein in sedimentary country-rock. The vein was up to 2 feet in width to a point 69 feet from the collar of the tunnel, where it split up into small stringers in the country-rock for a width of 6 to 8 feet at the face. These stringers are all barren-looking except the one in the centre of the face, which appears to be the main fissure, and a small streak on the right side of the face. A small slip to the west, 6 feet back from the face, was followed for 24 feet, showing only bull quartz for a few feet.

At an elevation of 1,125 feet, about 100 feet up the hill from the tunnel, an open-cut about 20 feet long and a tunnel 6 feet has been driven on a cropping of the vein, showing about 6 inches of solid sulphides, mainly pyrite. The face of the tunnel here shows a mineralized width of 6 feet, 18 inches on the foot-wall of mixed country-rock and quartz, slightly mineralized, then 6 inches of solid sulphides, and the balance to the hanging-wall of sparsely mineralized quartz and country-rock. The walls are well defined. I judge the open-cut is about vertically above the face of the lower tunnel, which is therefore not far enough advanced if the ore-shoot exposed above rakes into the hill.

A sample of the solid streak of sulphides in the face of the upper cut gave: Gold, $66 to the ton; silver, 2 oz. to the ton; copper, 1 per cent.

This is a very promising small showing and owing to its favourable situation can probably be made to pay. Mr. Brown is continuing work on this property as well as on the *Beaver*.

Copper Queen Group. This group is owned by J. H. Bell, Terrace, and consists of the three claims—*Copper Queen*, *New Find*, and *Rambler*. They are situated about 12 miles up Williams creek from the Lakelse wagon-road, on the west side. The predominating formation in this vicinity appears to be a grey andesitic rock, in

which are broad belts of argillite and limestone, the whole cut by a variety of igneous dykes. It cannot be very far from the Coast range.

The main showing is an epidote dyke more or less schistose, up to 100 feet in width in places. It can be traced for probably 2,000 feet on the surface. The mineralization is, in places, a finely disseminated chalcopyrite, which also occurs in fine, parallel seams. One cut shows a small bunch of chalcopyrite. The dyke has been broken into by open-cutting in probably ten places in 2,000 feet, each cut showing some mineralization, but the whole would average low in copper, less than 1 per cent. On the top of the hill the dyke cuts diagonally through a belt of limestone several hundred feet wide. The dyke narrows down to a few feet in width in the limestone, but can be seen protruding in isolated patches.

Altogether it is not a very satisfactory showing from a prospector's standpoint, because it is too big for a prospector's work to make much impression on. However, it might be worth an investigation by the larger copper companies. It is certainly indicative of great mineral deposition in that area and consequently very favourable for prospecting. There is a fair horse-trail from the main Lakelse road to the property.

Surprise Group.

This group is made up of six claims—*Surprise, Lucky Seven, Blue Bell, Hidden Trail, Omega,* and *Belmont*—adjoining the *Copper Queen* on Williams creek. The claims are owned by T. Turner, Terrace. The preceding description of the *Copper Queen* is applicable to this group. Some fine-looking silver-lead ore was brought in from a discovery on the Zymoetz River slope of Thornhill mountain by Wm. Dahl.

NASS RIVER MINING DIVISION.

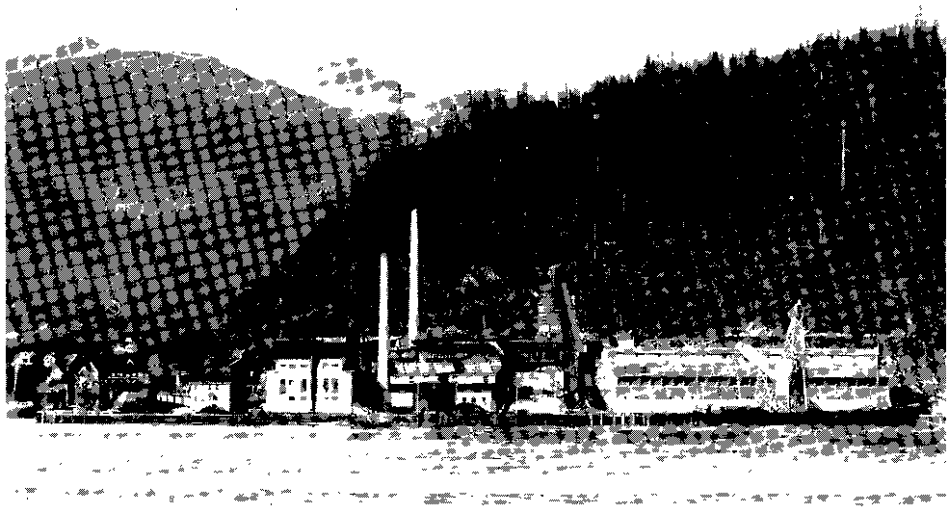
This Division extends from the mouth of Portland inlet north to the head of the Kitsault river, a distance of about 70 miles. The two mining centres are Anyox and Alice Arm. The Government recording office is at Anyox. There is a Government telegraph-office at Anyox and at Alice Arm. The Canadian National Coast-plying boats call at Anyox once a week and the Union Steamship Company's boat calls at Anyox and Alice Arm each week. There is also a tri-weekly launch service from Anyox to Alice Arm.

The town of Alice Arm, at the head of the arm of the same name, is the distributing centre for the Kitsault valley and tributary valleys, the Illiance river, and down Alice arm proper. The Dolly Varden Railway extends from tide-water at Alice Arm, 18 miles up the west side of Kitsault river to the *Dolly Varden* mine. Though the mine has been inoperative for the past three or four years, the Provincial Government maintains the railway for light traffic, such as hand-cars and gas-speeders, to enable prospectors and operators to get in supplies quickly and cheaply. From the upper end of the railway there is a first-class pack-horse trail to the head of the valley, 26 miles from Alice Arm, with branch trails up the main tributary streams. There are six bridges and two cableways crossing the Kitsault river at points most convenient for prospectors. There is also a first-class pack-trail for 16 miles up the Illiance river and fair trails up Lime and Roundy creeks.

During the summer there is a launch service once a week up the Nass river from Mill Bay (a port of call for the Union Steamship Company's boats) to Aiyansh. From Aiyansh roads extend through the Nass valley. There is a trail up the Nass river to Meziadin lake, thence to Stewart; a trail across to the Illiance river, thence to Alice Arm; a trail south to Kitsumgallum lake, following the Dominion telegraph-line, from the lower end of which there is a motor-road to Terrace, on the Canadian National Railway.

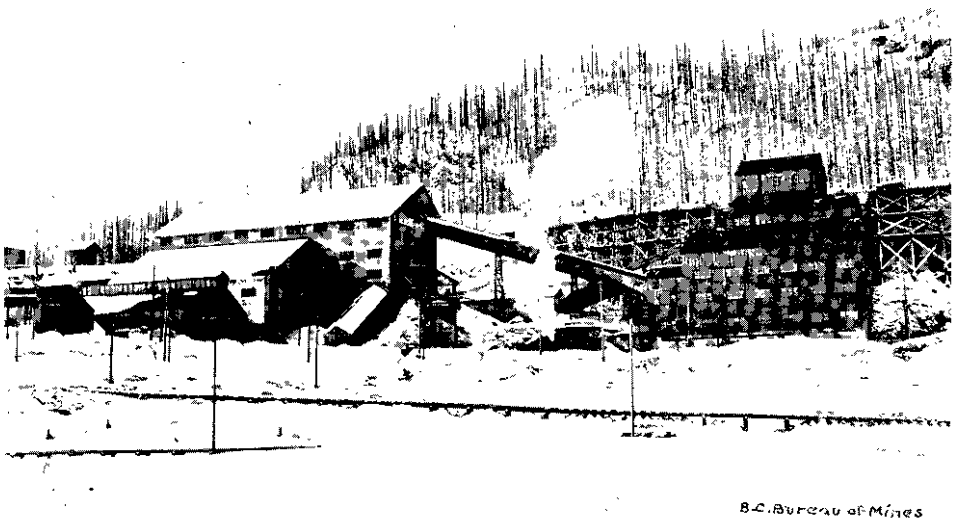
The Division is exceptionally accessible for prospecting and mining and the transportation is being improved and extended each year by grants from the Mines Department. The Division is the second largest producer in the Province, due to the operations of the Granby Company at Anyox. The smaller shippers are the *Golskeish, Esperanza,* and *Wolf.* The outstanding features of the Division this year are the increased production of the Granby Company and the development of the *Torio* property on the upper Kitsault river, which will in all probability be a substantial producer next year. I consider the Alice Arm country one of the most attractive for mining investments in this district.

The revival of activity is shown in the Government office statistics, which show an increase in miners' certificates issued, mining claims recorded, certificates of work (assessments), and applications for Crown grants.



B.C. Bureau of Mines.

Granby Consolidated Mining, Smelting & Power Co. Coke Plant at Anyox, B.C.



B.C. Bureau of Mines

Granby Consolidated Mining, Smelting & Power Co. Concentrator at Anyox, B.C.

OBSERVATORY INLET SECTION.

Granby C.M.S. & P. Co., Ltd.

This company has had a busy and successful year. The big mine and plant at Anyox has been operated continuously. The *Outsider* at Maple bay, on Portland canal, has been a steady shipper and some exploratory work was done on bonded properties. The *Hidden Creek* group produced this year 1,163,258 tons of ore, of which 416,292 tons went to the concentrator, producing 29,978 tons of copper concentrates. This is the greatest yearly tonnage ever produced by the company, exceeding last year's tonnage, which was high, by 112,525 tons. In addition to this, the *Outsider*, operated by the company, produced 45,596 tons of siliceous, low-grade copper ore, which is utilized for fluxing purposes. Altogether the production for the year was 6,997 oz. gold, 377,910 oz. silver, and 39,510,013 lb. copper, which is by long odds the best showing ever made by the company, the increase in copper-output over last year amounting to 3,500,000 lb. The total production of the *Hidden Creek* property, since the smelter was blown in in 1914, is 72,390 oz. gold, 3,830,260 oz. silver, and 331,187,931 lb. copper.

The concentrator has been treating an average of about 1,200 tons a day, the concentrates being shipped to Tacoma. Sintering has been experimented with during the year and a portion of the concentrates is now sintered and smelted at the company smelter. It is planned in 1926 to double the capacity of the concentrator and install a sintering plant that will handle the total concentrate-output of the enlarged mill. Everything will then be smelted at the company's own plant. This year the coke plant produced:—

Coke (tons)	57,446*
Tar (imperial gallons)	520,494
Tar paint (imperial gallons)	5,729
Gas (M. cubic feet)	882,147
Ammonium sulphate (lb.)	728,530
Concentrated ammonia liquor (lb.)	38,269
Motor-fuel (imperial gallons)	109,072
Light oil (imperial gallons)	134,927
Naphthaline (lb.)	32,800

An average of 1,045 men was employed throughout the year.

The personnel of the Anyox staff includes: Chas. Bocking, general manager; W. R. Lindsay, general superintendent; G. M. Lee, smelter superintendent; John Swanson, mine superintendent; George Leslie, coke-plant superintendent; W. B. Maxwell, concentrator superintendent; and C. M. Bagwill, chief accountant.

Golskeish Mines, Ltd.—This mine has been worked steadily all year under the competent management of H. Heidman. During the year there was shipped to the Anyox smelter 5,264 tons of quartz ore, yielding 473 oz. gold and 2,891.4 oz. silver.

ALICE ARM (PROPER) SECTION.

This includes the country tributary to the waterway, Alice arm.

Keystone Mining Co., Ltd.

This company was incorporated in January, 1923, with a capitalization of $200,000, of 200,000 shares, with its registered office in the Birks Building, Vancouver. The company acquired the *Sunset* group (*see* 1922 Annual Report) of seven claims on Roundy creek, owned by G. W. Morley, of Alice Arm. Owing to lack of capital very little work was done, and that unpaid for. I am informed, however, that the company affairs have been reorganized, all the indebtedness cleared up, and provision made to proceed with work in the spring.

ILLIANCE RIVER SECTION.

This section has been practically abandoned for the past two years. In 1925 the zinc-showings on McGrath mountain have been investigated by several engineers.

Standard Group.

There are four claims in the group—*Standard* and *Standard Nos. 1, 2,* and *3*—owned by Miles Donald, of Alice Arm, and partners. The showing consisted of what had all the appearance of an immense quartz vein lying in argillite, heavily mineralized with sphalerite. It was exposed for 60 feet by open-cutting along the side-hill, containing sections up to 2 feet thick of solid zinc-blende.

* Produced from a mixture of British Columbia and Alberta coal.

Last winter the Granby Consolidated secured an option on it and this spring started exploratory work. A great deal of surface cutting and stripping was done, demonstrating to the company's satisfaction that the vein is comparatively narrow and flat and sparingly mineralized, and therefore not up to the requirements of the company. Work was consequently stopped and the option relinquished.

KITSAULT RIVER SECTION.*

This section takes in all the Kitsault valley and tributary valleys from tide-water to the glacier at the head of the river.

The mining situation has taken a noticeable turn for the better on account of the very gratifying results of the development of the *Toric* and the possibilities of that property. Confidence in the section by the property-owners has been restored and I look for a more active year than the section has had since the closing-down of the *Dolly Varden* mine.

Portions of the railway-grade were damaged late in the fall by freshets and slides; these, no doubt, will be attended to early in the spring, so that mining operations will not be retarded.

Wolf. This Crown-granted claim is owned by John Stark and was staked by him several years ago. It is situated just above the railway-track opposite the town of Alice Arm and was bonded this fall by J. Fiva. The vein is a quartz vein varying up to 12 or 14 inches in width and bedded with the country-rock of slate and lying very flatly. The hanging-wall has been stripped off the vein for a length of 125 feet and the vein mined out, sorted, and sacked. A shipment consisting of 93 sacks of high-grade and 273 sacks of second-grade ore was sent to the Trail smelter. The 4½ tons of high-grade assayed $5.40 in gold and 306.4 oz. in silver to the ton. The 273 sacks of second-grade weighed about 12½ tons and assayed $2.20 in gold and 80 oz. in silver to the ton.

A crosscut tunnel has been started and will be driven during the winter a distance of approximately 100 feet to cut the vein, which can then be stoped from the crosscut tunnel level.

Esperanza Group. (*See* previous reports.) This property, situated about a mile from Alice Arm on the west side of the Kitsault river, is owned by a syndicate of seven in Anyox. In 1925 the property has been worked under a lease by Norman Fraser, one of the syndicate. Several shipments have been made of two classes of sorted ore, the high grade going to Trail and the second grade to Anyox. In all, 156 tons were shipped, yielding 10.7 oz. gold, 8,512 oz. silver, 1,300 lb. lead, and a negligible amount of copper.

Other leases have been let on the old workings and work will be carried on through the winter.

Alice Group. This group of four claims—*Alice, Butte, Silver Ridge*, and *Progress*—is owned by J. Smith and associates, of Anyox. The showing is a quartz vein up to 16 to 20 inches wide lying in the argillite country-rock and is, with little doubt, the extension of the *Esperanza* vein. Several open-cuts have exposed the vein on the surface for a considerable distance; one cut in particular, about 150 feet below the cabin, disclosed a well-defined vein, 8 inches of which is well mineralized with galena, pyrite, and some zinc-blende, carrying high silver values in silver sulphides, fine specimens of ruby silver being found. Just below this showing an open-cut of 20 feet and then 24 feet of crosscut tunnel following the north wall of a dyke were driven, cutting the vein. The vein, striking N. 60° to 65° W. and dipping 60° W., was drifted on for 36 feet, bringing it under the high-grade ore exposed on the surface, but no values of any account were obtained, though a depth of only 25 feet was gained. It would be as well to drive the drift another 20 feet in case the ore-shoot rakes into the hill at a flat angle and would consequently be above the face.

The vein crops strongly on the south side of the dyke followed by the crosscut tunnel. I think this vein is deserving of close prospecting.

Alice Arm-La Rose Mining Co.. This company was incorporated in February, 1920, with a capitalization of $1,000,000, of 1,000,000 shares, the registered office being in Prince Rupert. The four claims—*Britannia, Britannia No. 1, Britannia No. 3*, and *St. Elois*—forming the company's holdings are situated on Paul Klayduc creek, about 2 miles from the Dolly Varden Railway. There is a first-class pack-trail from the railway to the property.

* G. Hanson: Summary Reports, 1922, Part A, and 1923, Part A, Geological Survey, Canada.

Several small shipments of high-grade silver ore were shipped by the owners prior to incorporation. The rock formation is blocky argillite and the vein is of quartz up to 18 inches wide, mineralized with galena, zinc-blende, pyrite, grey copper, argentite, and native silver. The sorted ore averaged nearly 300 oz. in silver to the ton. The ore shipped was taken from a shaft about 20 feet deep, from which a little stoping was done.

This year the necessary capital was raised and a crosscut tunnel was driven at 2,000 feet elevation, cutting the vein at 350 feet from the portal, and continued to 420 feet. A drift on the vein toward the shaft was then started. About 70 feet of work will be required to reach its objective, when a raise will be put through to the bottom of the shaft, about 120 feet. The values in the vein where it was cut were low, but stringers of high-grade ore are reported as work progresses. Some exploratory work in the bottom of the shaft disclosed about a foot of high-grade ore beyond a small dyke which had displaced the vein. The outlook for the property is encouraging and on the resumption of shipping this winter further development will probably be carried on.

LATER.—It has just been reported (February 1st, 1926) that the drift from the crosscut tunnel has encountered 3 feet of shipping-ore, of which 1 foot is very high grade, at a point about under the shaft on the surface. Should this be continuous through it will give 120 feet of stoping-ground to the bottom of the shaft, which will mean steady shipments from now on.

Bunker Hill Group. (*See* Minister of Mines' Report, 1923.) This group of seven claims on Haystack mountain, Granite creek, owned by Jas. Calvin and Jos. Tretheway, were Crown-granted this year. A first-class foot-trail was built from the La Rose property to the showings, making the property easily accessible.

Speculator No. 2. This is a Crown-granted claim adjoining the LaRose group and owned by Jas. Calvin, of Alice Arm, and A. B. Armstrong, of Stewart. In 1925 the owners opened up a small vein of quartz, which will very probably prove to be the extension of the LaRose vein, as the mineralization is the same. A sample taken from the vein of 4 inches of good-looking ore assayed 148 oz. in silver to the ton, so that the vein warrants further exploration.

Kitsault River Mining and Development Co., Ltd. This company was organized in December, 1924, with a capitalization of $1,000,000, divided into shares of the par value of $1 each. The registered office is at Alice Arm. The company's holdings are the following claims: *Fox*, *Fox Fraction*, *Matilda*, *Elk*, *Martin*, *Blue Ribbon*, *Mountain Goat*, and *Silver Tip Fraction*, situated on the west side of the upper Kitsault river, about 8 miles north of the Dolly Varden Railway, from which there is a first-class pack-horse trail. The work done this year, under the supervision of Oscar Flint, one of the owners, was confined mainly to the *Matilda*. The general rock formation of Homestake mountain is Hanson's Dolly Varden formation of massive volcanics. The surface showing on the *Matilda* at the tunnel, 4,300 feet elevation, indicates a mineralized width of about 30 feet. The vein-matter, striking east and west (mag.) is silicified andesite, rather heavily pyritized with traces of galena, the more siliceous portions carrying the best mineralization of galena, zinc-blende, pyrite, and chalcopyrite. A sample of the best-looking copper ore assayed: Gold, trace; silver, 1.2 oz. to the ton; copper, 4 per cent. A sample showing mainly zinc, with a little galena, assayed: Gold, trace; silver, 1 oz. to the ton; lead, 1 per cent.; zinc, 16 per cent.

About 35 feet of tunnel had been driven previously, but had swung away from the vein. The tunnel was extended about 20 feet this year, cutting diagonally across the vein to the hanging-wall, then drifting on the vein and back to the foot-wall, which shows a better grade of ore. There is a width of about 5 feet of this ore showing in the vein on the surface both above the tunnel in a cross open-cut and below the tunnel along the creek, at which the drifting should be done.

There are several similar parallel veins all heavily pyritized, which is low-grade ore, but showing more galena and zinc where silicification has been more intense. So far as known, these veins are small, there being only three of sufficient size to be of probable importance, one north and one south of the *Matilda* vein.

On the *Fox* claim a vein of greenish rock, heavily pyritized, solid in places, carrying an appreciable percentage of copper, strikes almost at right angles to the main veins as shown on the *Matilda*. At 4,000 feet elevation, on the west end of the mountain above the glacier, a tunnel has been driven 35 feet, following a siliceous vein in which a little galena shows, as well as a

fine-grained pyrite. A trace of grey copper can occasionally be found on the seams' faces. I would not, however, consider this showing as promising as the *Matilda* veins.

There has been a lot of work done, and well done, for the amount of money expended.

Second Thought Group.

(*See* Report, 1918.) There are four claims in this group, owned by Geo. Casey, Prince Rupert, and Jack Graham, Alice Arm. The property is situated about 4½ miles from the end of the Dolly Varden Railway on the main Kitsault trail, near the bridge crossing the Kitsault river to the *Vanguard*. Considerable work has been done in open-cutting a strong-looking vein carrying fair values on the surface. A crosscut tunnel was driven for 50 feet, cutting two veins. During 1925 a short drift was run on the first vein, about 24 feet from the portal of the tunnel, showing it to be 8 feet in width of slightly mineralized banded quartz and slate. The second vein at 45 feet in the tunnel shows only a foot or two of slate and quartz stringers.

Climax Group.

This group of two claims—*Climax* and *Climax No. 2*—owned by Olier Besner, Prince Rupert, is situated on the north side of Trout creek, adjoining the *Moose* and *Silver Horde*, and about 2½ miles from the end of the Dolly Varden Railway. The general rock formation is andesite. The overburden on the claims is very heavy and it has therefore taken a great deal of stripping and trenching to locate and expose the vein. The work shows that the vein is very probably the extension of the *Moose* vein. One open-cut exposes a width of vein of about 30 feet, and at this point a tunnel 50 feet long and a crosscut of 15 feet was driven under contract in the fall of 1925. This work has opened up a well-mineralized but low-grade vein for that distance and width without getting all the way across the vein. Bunches of fine-grained galena were encountered during the work, assaying 60 per cent. lead and 10 oz. in silver to the ton, with a small percentage of zinc. A sample of the typical hard quartz mineralized with fairly coarse pyrite assayed 5 oz. in silver to the ton and trace of gold. A sample of softer vein material, slightly pyritized, showing trace of ruby silver, assayed 43 oz. in silver and 40 cents in gold to the ton.

A sample taken across the tunnel at 35 feet from the mouth assayed 0.5 per cent. lead and 3 oz. in silver to the ton. A sample at 45 feet in the tunnel gave 3 oz. in silver to the ton and 9 per cent. lead, and at the face 9 oz. in silver to the ton and 2.5 per cent. lead. These values make further exploration worth while.

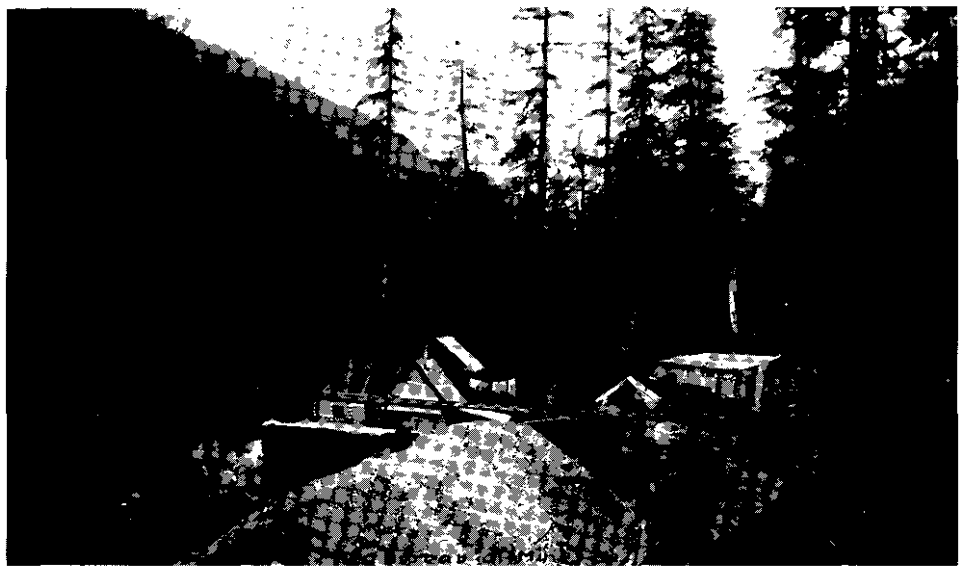
Enrichments may be expected along, and in the region of, any faulting in the vein; in fact, all the veins in the upper Kitsault in the andesite-silver formation are worth exploring for that reason.

Other properties in this area having similar conditions as to rock formation, vein-filling, mineralization, and values are the *Moose*, *Chance*, *Silver Horde*, *Musketeer*, *Wolf* (of the *Dolly Varden*), and *Tiger*, each with the possibility of furnishing enriched fault-zones similar to the *Dolly Varden* and each with the probability of developing tonnages of milling-grade ore.

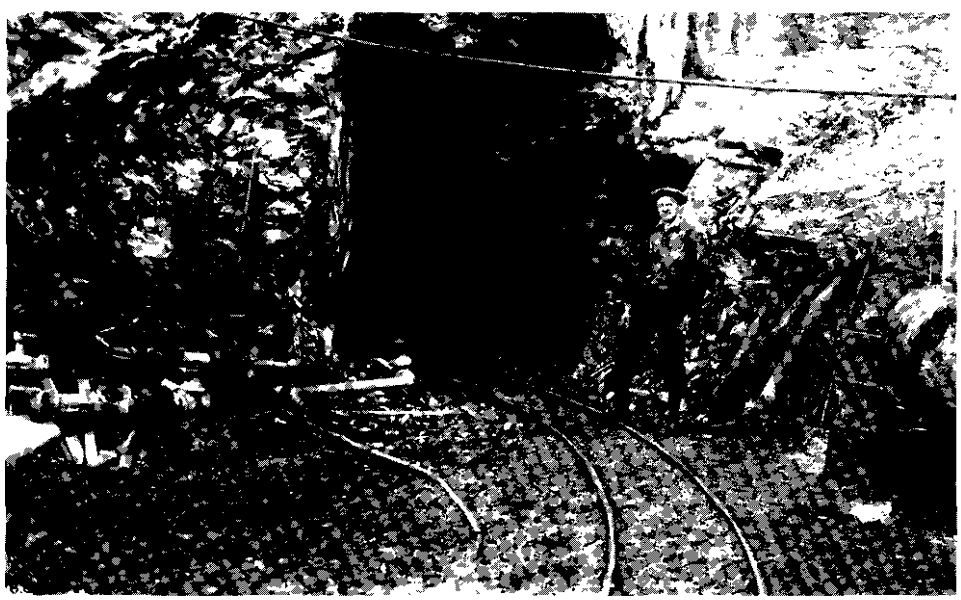
Toric Group.

This group consists of four claims—*Toric*, *Anglo*, *Moose*, and *Lamb*—situated on the east side of the Kitsault river, about a mile above the end of the Dolly Varden Railway, from which point there is a fine suspension bridge across the river and a wagon-road to the property. In August, 1924, the property was optioned by the stakers and owners, John and Gus Strombeck, of Alice Arm, to the Consolidated Homestake Mining and Development Company, Limited, which had been exploring, under the management of A. C. Gerhardi, the *Homestake* group at the head of the Kitsault river. The company was incorporated in May, 1921, with a capitalization of $500,000, divided into 100,000 shares, its registered office being in the Credit Foncier Building, Vancouver. The claims were surveyed during 1925 and Crown grants obtained in August.

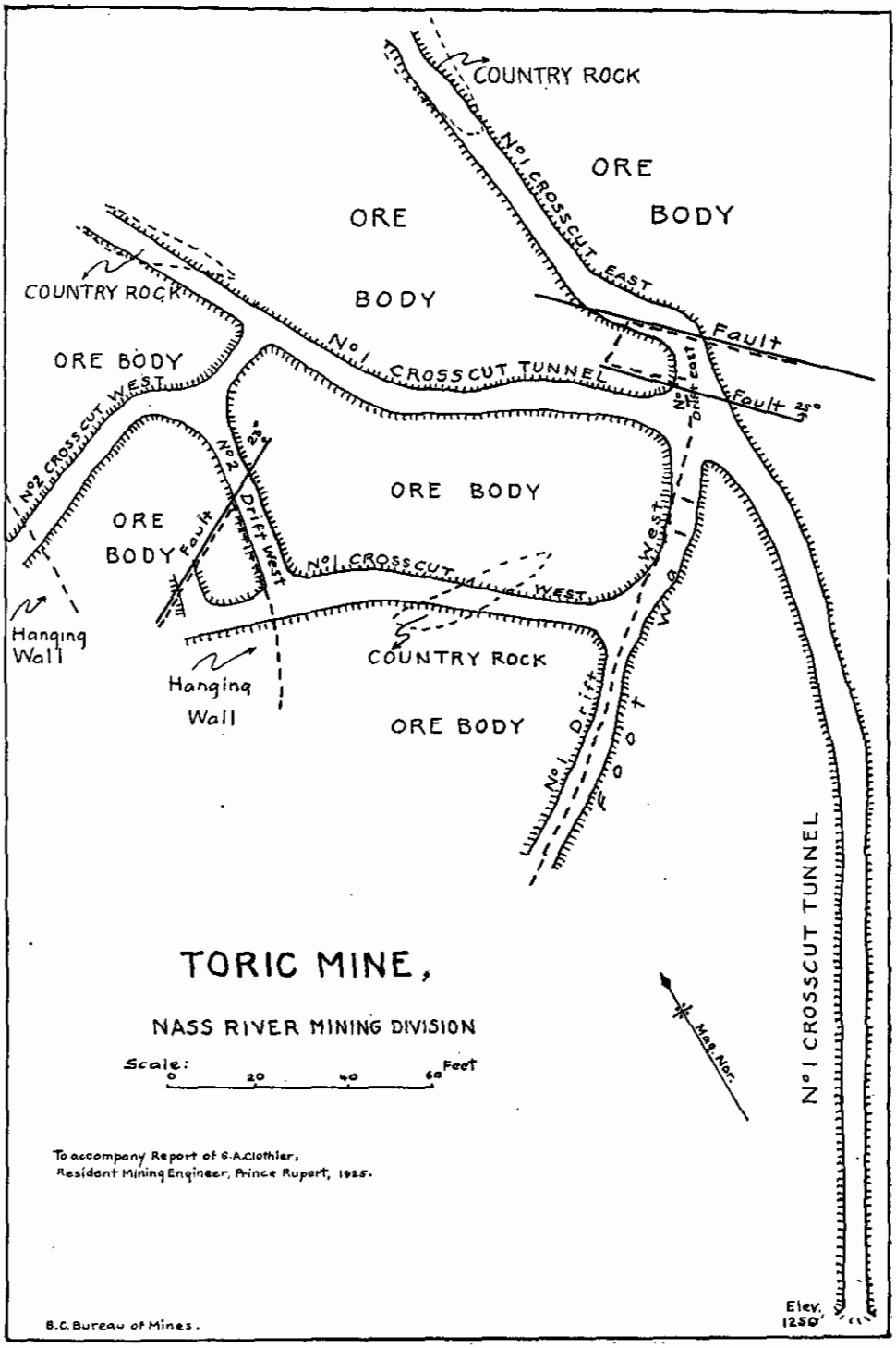
The rock formation is Hanson's Dolly Varden formation, consisting of massive volcanics, which here is grey andesite. The owners had done considerable work on both veins discovered on the property, the upper vein, however, showing only low values wherever opened up. On the lower or main vein the first cut is at the foot of the hill, about 150 feet above the trail, here showing a width of about 20 feet. Five feet on the foot-wall is mineralized, banded quartz, jasper, and barite; then 8 feet of country-rock; then 4 to 7 feet on the hanging-wall, of similar ore to the foot-wall. The ore here averages about 17 oz. in silver to the ton. Three or four open-cuts up the hill from this, in a distance of about 500 feet along the outcrops, show about a foot of ore in a 4-foot vein, carrying high values in ruby and native silver and argentite.



Torie Mine, Kitsault River, Nass River M.D.



Outsider Mine, Portland Canal M.D.


COUNTRY ROCK
No 1 CROSSCUT EAST
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No 2 Drift West
Fault
ORE BODY
ORE BODY
No 1 CROSSCUT WEST
No 1 Drift West
Hanging Wall
Hanging Wall
COUNTRY ROCK
ORE BODY
No 1 Drift
No 1 CROSSCUT TUNNEL
TORIC MINE,
NASS RIVER MINING DIVISION
Scale: 0 20 40 60 Feet
Mag. Nor.
To accompany Report of G.A.Clothier, Resident Mining Engineer, Prince Rupert, 1925.
B.C. Bureau of Mines.
Elev. 1250'

This was the condition of the property when taken over by the company. A tunnel was then started just above the road and driven 215 feet to the ore-body, part way through slide-rock which necessitated timbering and was slow work. (*See* map.) A good camp was erected and a small compressor plant installed. From the end of the crosscut tunnel a drift was run east for 6 feet and another west for 97 feet along the foot-wall of the vein, which was shown to strike east-west (mag.) and dip from 35° to 45° north. The main tunnel was continued 147 feet across the ore-body, of which 128 feet was in ore. The hanging-wall appears to stand a little straighter than the foot-wall. This gives a width of ore between walls of about 70 feet.

At a point in the west drift 50 feet west of the main tunnel another crosscut was driven in the ore-body, and from the east drift another crosscut (No. 1 crosscut east) was also driven in ore about 90 feet. Altogether over 500 feet of work has been done, in addition to the main crosscut tunnel to the vein, in blocking out a body of ore approximately 70 feet wide, 175 feet long, and 200 feet through to the surface on the dip of the vein. Though the vein-width on the tunnel-level may not carry through to the surface, nevertheless an estimation of the probable tonnage of ore for the amount of work done gives rather surprising figures. A further vertical depth of 100 feet may be obtained on the vein with another crosscut tunnel. All the crosscuts have been sampled every 10 feet by the manager, A. C. Gerhardi, who states that the whole will average better than $12 a ton, and estimates that a net profit of at least $6 a ton can be made on this class of ore after the erection of a 50-ton-capacity concentrator. The foundations have already been made for this and work will be started as early in the spring as possible, and it is expected to have it in operation in the fall of 1926. A crushing capacity of 100 tons a day is being installed, though only a 50-ton treatment unit will be built at first. Tests have shown that amalgamation and table concentration give the best recovery.

The financial statement of the company, both as to expenditures to date and available capital for future operations, is very satisfactory. There is every reason to believe that the property will be on the shipping-list in 1926 and will eventually become one of the big mines of the Province, for which credit will be due Mr. Gerhardi.

Devlin Zinc. This property, consisting of the *Devlin Zinc* and *Devlin Zinc Nos. 1, 2,* and *3,* was bonded in the spring by John Devlin, probably better known as the "Gunner from Galway," who died in Vancouver about the end of the year. The claims are situated up the East fork of the Kitsault river, the trail to which was put in repair this summer through a grant from the Mines Department. A contract was let for 100 feet of drifting on some zinc-showings. I did not see the property this season, as very little had been done on the showings at the time I was in Alice Arm. I have no information as to the results of the work done.

There are a number of groups in the section which have been reported on previously and on which only assessments have been done since. The more important are: *Independent,* just above Alice Arm, owned by Archie McPhail; *Lone Maid,* above the *Esperanza,* showing high-grade silver ore; *Lyon,* above Alice Arm, owned by Neil Forbes; *Wild Cat,* on Homestake creek, copper-showings, owned by A. Davidson; *Vanguard,* 4 miles north of *Dolly Varden,* fine copper-showing on which considerable work has been done by the owner, Morris Peterson; *Summit,* at head of Clearwater, owned by A. Davidson, who employed two or three men on it all summer; *Chance,* on Trout creek, the crosscut tunnel extended toward vein this season by owners, McPhail and Morley; *Basin,* owned by Angus McLeod, a copper-showing at head of East creek, up which a trail was built this year by a grant from the Mines Department; *Homeguard,* a copper-silver showing owned by William McFarlane, opposite Mile 12 on Dolly Varden Railway, is reached by a cableway across the river; *Silver Band,* on McGrath mountain, on which there is a zinc-showing, owned by Morley and Clary, of Alice Arm; *Monarch,* on Illiance river.

PORTLAND CANAL MINING DIVISION.

This Division includes the country north of Pearce island, in Portland inlet, on the east side of Portland canal (the west side is Alaska), to the summit of the range between Portland canal and Observatory inlet, north to Mount Brown, from which point northwards it takes in the whole drainage area of the Nass river. The northern portion, although over the Bear River divide, is included in the Division, for the reason that it is reached by way of Stewart, where the Government office is located, and where, therefore, it is most convenient to make records and obtain information from the Government records.

Stewart, at the head of Portland canal, is the distributing-point for the Division. It is the most northerly seaport in British Columbia and therefore the logical outlet for all the Northern Interior country. There is a Government telegraph-office and at Hyder, 2 miles south on the Alaska side, there is a radio-office. Stewart has a weekly service by both the Canadian National Company and the Union Steamship Company from Prince Rupert and Vancouver.

Salmon river has a good auto-road to the *Premier*, 17 miles, from which trails branch to all parts of the upper Salmon valley, making it accessible for mining operations of any kind.

Bear River valley had a wagon-road and railway to the *Red Cliff*, 14 miles from Stewart, but the railway is entirely out of commission and the wagon-road passable for only 8 miles. Enough money was spent on it this year to make it servicable all the way through, but Muddy gulch, the only impassable place on it, was not touched. The main Bear River trail extends from the end of the wagon-road up the river, over the divide, and down to Meziadin lake in the Nass basin. Branch trails, from the main road and trail, up tributary creeks makes the whole valley easily reached.

Of the thirty companies incorporated this year with holdings in the North-western District, about twenty-four are directly interested in the Portland Canal Mining Division, and of seventy companies operating in the whole district in 1925 forty-eight were in this Division. It seems only reasonable to expect that some of them will develop into important shippers.

The development during 1925 has greatly exceeded any previous year and the outlook for 1926 is exceedingly favourable.

There are several outstanding features for the past year; the increasing of the power capacity and doubling the tonnage of the concentrator by the Premier Company is very significant, in that it indicates many years of steady production ahead; the final success of the B.C. Silver in locating and developing sufficient ore-bodies of good-grade ore to make it a mine is certainly gratifying to those interested in the district; the very promising development of the *Big Missouri* means much to the upper Salmon valley; the reorganization and reopening of the *Dunwell* and further discoveries of high-grade ore on the surface this year will have a good effect on the Bear valley; the interest taken by the Sebakwe and District Mines, Limited, in the Bush mines may have far-reaching effects.

There have been no spectacular developments, but good steady progress has been made on such properties as the *Silverado, Porter-Idaho, Lakeview, Emperor, Bayview, L. & L., Victoria, Terminus, Independence, Silver Tip, Silver Crest, Troy, Spider*, Bush Mines, and others, notwithstanding the feeling of doubt brought about by the non-operation of the *Dunwell* in the early part of the year. Altogether it looks as if the future of the Salmon and Bear River valleys was assured and the permanency of the town of Stewart established.

I think that a great part of the general progress of the country is the result of the policy of granting assistance for roads and trails throughout the district by the Department of Mines. The effect of this is becoming more apparent each year.

PORTLAND CANAL SECTION.

This includes the country bordering Portland canal on its east side, from Pearce island to its head at Stewart, and is a part of the whole Portland Canal Mining Division, with which it should not be confused.

Outsider. This property, situated at Maple bay on Portland canal, is being worked on a royalty basis by the Granby Consolidated. The ore is a siliceous, low-grade copper ore, utilized for fluxing purposes at the company smelter at Anyox. It is mined on contract. This year 45,596 tons of ore was shipped to the smelter, yielding 1,859,735 lb. of copper, which is included in the Granby output figures.

Georgia River Area.—The trail from the beach up the river was repaired and extended in 1925 by a grant from the Department of Mines. No development, other than assessments, was done in 1925. The completion of the trail will very probably result in extensive exploration of this very promising gold area.

Bull Dog Creek Area.—A lot of prospecting and staking has been carried on in this area during 1925. The Gloria Mining Company has had a small crew on prospecting and development work. The property-owners have petitioned for a trail up the creek from the beach. I expect to get in there early in the spring of 1926.

Silver Slipper Mining Co., Ltd.

This company was incorporated in April, 1925, with a capitalization of $500,000, divided into 2,000,000 shares of the par value of 25 cents each. The registered office was in the Vancouver Block, Vancouver. The company acquired the *Silver Shoe* group of six claims—*Silver Shoe No. 1*, *Silver Shoe No. 2*, *Silver Shoe No. 3*, *Silver Shoe No. 4*, *Silver Shoe Fraction*, and *Silver Shoe Fraction No. 2*—recorded in the names of J. J. Haahti, William Noble, and H. Hill. The claims are situated on the Portland Canal slope of the mountain north of the mouth of the Marmot river and extend from tide-water up to the summit. They are adjoined on the north by the *Silver Bell*.

The easiest route to reach the showings is across the face of the mountain from the upper *Silverado* camp, keeping at about 4,000 feet elevation. In 1925 a trail was built from a point on tide-water about 3 miles below Stewart, up, I believe, to the foot of the main mountain, from which point it would be practically impossible to get up to the showings on account of the ruggedness of the bluffs. The general country-rock is McConnell's Bear River formation, locally called greenstone.

Crossing from the *Silverado*, the first showing on the Silver Slipper property is a small quartz vein (No. 2) varying from a few inches up to 14 inches in width and sparsely mineralized with pyrite, sphalerite, and traces of galena. The vein dips at a low angle and strikes, as nearly as could be judged, east into the hill. No work has been done on it except some pick-work where any mineral shows and it is only exposed for a very short distance. Pieces broken off along the cropping assayed 20 cents to the ton in gold, 63 cents to the ton in silver, a total of 83 cents to the ton. Specimens of the sulphides may assay up to $85 to the ton as claimed, but the percentage of that class of ore, as far as can be seen or expected, would be negligible.

The owners picked up some small pieces of zinc-blende and pyrite, which they identified as the best ore from another small vein still higher up the hill, and which assayed 21 cents to the ton in gold and silver. I did not examine this latter vein.

Farther south, at 4,500 feet elevation, another small quartz vein advertised as of great importance was picked into in the bed of a small stream and enough taken out to form a sample. I found it only a stringer a few inches in width, from which a sample of several pieces assayed $8.80 to the ton in gold and $4.83 to the ton in silver.

Farther south along the north side of a deep canyon there is an outcropping of barren white quartz about 10 feet wide that can be seen above and below this point a few hundred feet. It strikes N. 85° (mag.), about paralleling the small veins, and dips approximately 80° S. It is exposed in a bluff to a height of 50 feet. At the base of the bluff, at 4,100 feet elevation, a short tunnel has been driven, exposing this outcropping for a width of 6 feet on the hanging-wall side. There is no mineralization in the quartz, which is, in places, copper-stained; only along the seams has there been a slight oxidation from circulating water, in which a seam of chalcopyrite has been deposited, from which obviously the stated assay of $20 to the ton was obtained. On the foot-wall there was also a little deposition of chalcopyrite in the soft oxidized material. This showing does not merit exploration. Below this quartz-cropping and on the north side of the canyon an open-cut was driven across a cropping of reddish-coloured rock, but no mineral was found.

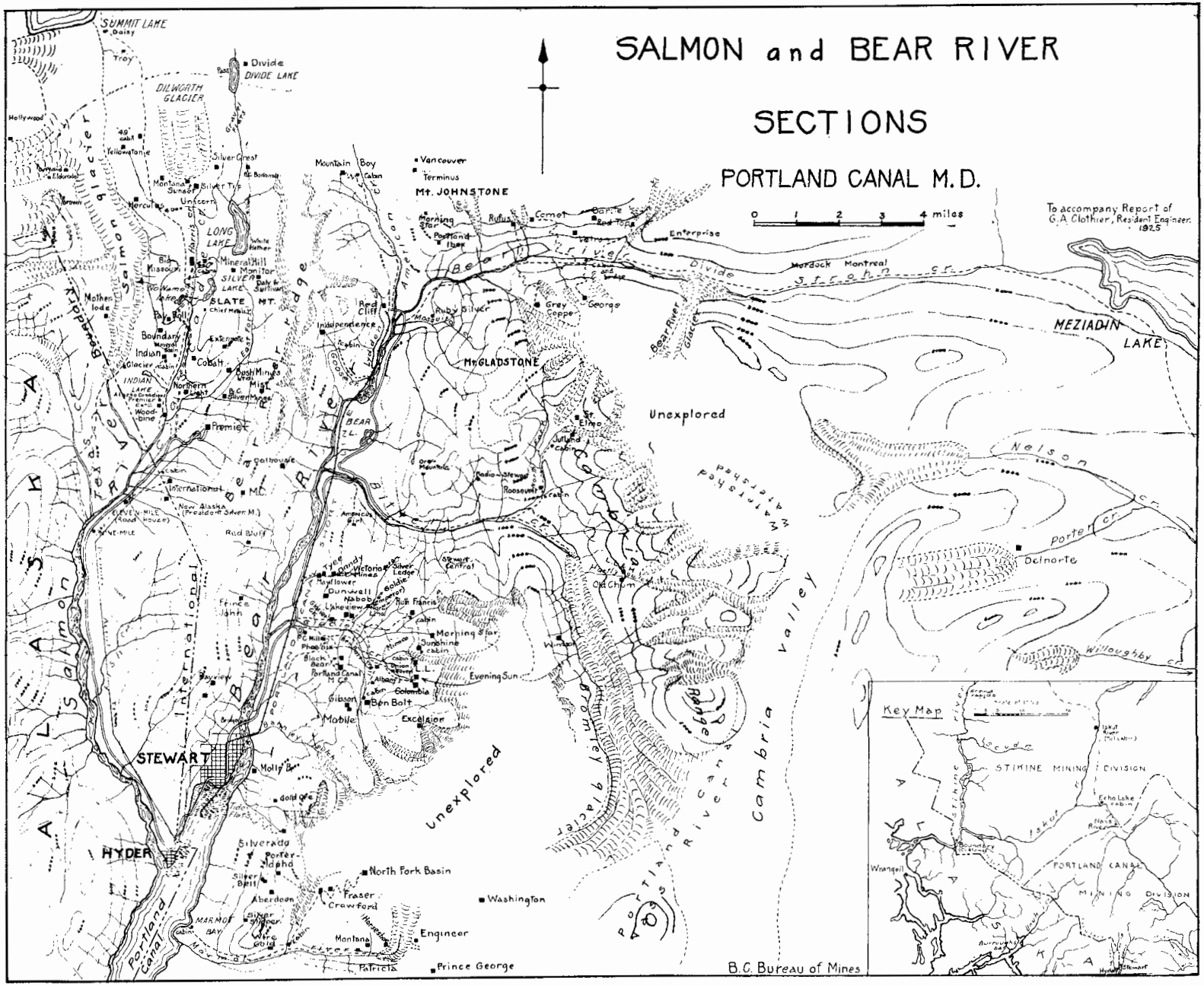
I considered the property entirely misrepresented to the public and so reported to the Minister of Mines.

Silver Bell Group.

This group consists of eight claims—*Silver Bell Nos. 1*, *2*, and *3*, *Silvernight*, and *Silver Bank Nos. 1*, *2*, *3*, and *4*—adjoining the Silver Slipper on the north and the *Silverado* on the south. They are owned by J. J. Haahti, R. Riebe, and associates. The showing is from 2 to 4 feet wide, of altered and mineralized greenstone bordering a broad belt of schistose greenstone, the mineralization consisting of small seams of pyrite, zinc-blende, and traces of galena. A sample of the ore assayed 4.1 oz. silver to the ton. It is not a very impressive showing, but probably should be demonstrated further by drifting.

MARMOT RIVER SECTION.

This is the drainage area of the North and South forks of the Marmot river, which empties into Portland canal on the east side about 4 miles below Stewart. A serviceable floating dock has been built in Marmot bay to facilitate handling of mining supplies and ore-loading. This year a road was started from the beach to the forks, but, being built on the lines of a boulevard instead of a mountain road, it did not get very far for the expenditure.


SALMON and BEAR RIVER
SECTIONS
PORTLAND CANAL M.D.
0 1 2 3 4 miles
To accompany Report of G.A. Clothier, Resident Engineer. 1925
SUMMIT LAKE
Divide
DIVIDE LAKE
DILWORTH GLACIER
Mt. JOHNSTONE
Vancouver
Terminus
Mountain Boy
Rufus
Comet
Enterprise
Mordock Montreal
Bear River
Divide
Strohn cr.
MEZIADIN LAKE
Mt. GLADSTONE
Grey Copper
George
Ruby Silver
Red Cliff
Independence
Unexplored
Nelson cr.
Porter cr.
Delnorte
Willoughby cr.
Cambria Valley
Cambria Range
Bromley glacier
Portland Canal
Salmon River
Salmon glacier
Bear River
Bear River Ridge
International
Texas cr.
Boundary
Indian
Cobalt
Premier
Mother lode
Mineral Hill
Monitor
SILVER LAKE
SLATE MT.
LONG LAKE
Silver Crest
Silver Tip
Montana
Hercules
Yellowstone
Mountain Boy
Cabin
Morning Star
Portland Ibex
Red Tops
Barite
Vetro
Bear River Glacier
Bear River
Cambria
Old Chum
Windsor
Evening Sun
Colombia
Ben Bolt
Excelsior
Mobile
Gibson
Morning Star
Sunshine
Ruth Francis
Dunwell
Nabob
Lakeview
Victoria
Mayflower
Prince John
Bayview
Molly Br.
Gold Ore
STEWART
HYDER
Silverado
Porter-Idaho
Silver Belt
Aberdeen
Silver Slipper
Wire Gold
MARMOT BAY
North Fork Basin
Fraser
Crawford
Washington
Engineer
Montana
Patricia
Prince George
Portland Canal
Key Map
STIKINE MINING DIVISION
PORTLAND CANAL MINING DIVISION
Wrangell
Iskut River
Echo Lake cabin
Nass River
Burroughs Bay
Hyder
Stewart
B.C. Bureau of Mines

This section has been very active this season and bids fair to become a very important producing section of the district.

Porter-Idaho Mining Co., Ltd.

This company was organized in January of this year with a capitalization of $2,000,000, divided into 4,000,000 shares, the registered office being in Stewart. The company took over the holdings of the Porter-Idaho Syndicate, which had been organized in 1923 with a capitalized value of $150,000, divided into 15,000 units of $10 par value each. Of these, 1,600 units were sold to operate the property. The group of claims consists of the following: *Gem of the Mountains, Lucille, Slide, Nettie L., Prickly Heat, Sunday,* and *Never Sweat,* situated west of the glacier at the head of the North fork of the Marmot river and originally staked by Clay Porter and associates.

The pack-trail from the beach to the mine, about 8 miles, was greatly improved this year and is now in first-class condition, with the exception of a few steep pitches. During the summer months 177 tons of ore was shipped, costing $50 a ton for packing to the beach. The gross smelter returns averaged $96.53 a ton, netting the company about $30 a ton after all packing, freight, treatment charges, etc., had been deducted.

Operations were started early in April. Altogether 1,050 feet of work was done, consisting of 385 feet of crosscutting, 60 feet of sinking, and 60 feet of raising, the balance being drifts on the veins. A great portion of this work consisted of sinking on ore exposed last year and drifting from the bottom of the winze for about 300 feet. Ore was encountered in bunches and short lenses, in which raises were run to stope from. This deeper work has demonstrated that larger ore-bodies may be expected below the zone of intense oxidation and leaching.

To obtain greater depth on these ore-bearing veins a crosscut tunnel was driven early in the year from the head of the big gulch for 300 feet, cutting in that distance two very well-defined veins showing on the surface. These veins, one 7 feet and the other 5 feet wide, since the distance below the surface is comparatively small, are completely oxidized where cut and the values are therefore small. They are exceptionally clean-cut fissures and drifting on them to the north-east into the hill should get below the oxidation horizon at no great distance, after which important ore-bodies of high-grade ore can reasonably be expected. This work is now under way on the 7-foot vein and will be carried on throughout the winter.

I am reliably informed that high-grade ore was encountered at about 60 feet from the main crosscut, but no information as to its importance is available.

This winter's work will probably have an important bearing on the future of the property. All the work at the mine has been under the able supervision of Clay Porter, who is making haste slowly.

Sterling Silver-Lead Mines, Ltd.

This company was incorporated in March, 1925, with a capitalization of $2,500,000, divided into 2,500,000 shares, its registered office being the Pemberton Building, Victoria. The company acquired on option the following four groups and individual mineral claims, totalling twenty-two claims: *Wire Gold* group of four claims; *Forks* group of two claims; *Dwyer* group of three claims; *Fraser* group of seven claims; *Mountain View; Mountain Boy* and *Mountain Top* claims; *Crawford* claim; and *Elizabeth* and *Grand Canyon No. 1* claims, all adjoining and situated between the North and South forks of the Marmot river, with the exception of the *Wire Gold* group, which lies on the north side of the river below the forks.

Marmot Metals Mining Co., Ltd.

This company was incorporated in April, 1925, with a capitalization of $1,500,000, divided into 3,000,000 shares. The registered office is at Stewart. The holdings consist of the *Montana* group of five mineral claims—*Montana, Peach No. 1, Peach No. 2, May, Maude,* and *Horseshoe*—situated on the north side of the South fork of Marmot river, about 4 miles from the beach. There is a first-class horse-trail from the beach to the foot of the hill below the workings. From here the company has this year built a foot-trail to the camp and to the different workings on the claims, amounting to some 3 miles. A considerable amount of development-work had been done in the earlier days on the *Montana* and several tons of sorted high-grade silver ore shipped.

Work during 1925 consisted of trail-building, camp-construction, surface exploration, and the driving of two tunnels. This exploration-work has been satisfactory, in that several veins have been discovered in the greenstone formation lying north of the granite spur, which latter occupies the southern portion of the claims. A particularly promising vein was exposed on the *Horseshoe,* the south-eastern claim of the group, along the contact of the greenstone and a wide limestone-

belt. The vein is stated to be 6 feet wide and traceable for several hundred feet on the surface. This vein was discovered late in the season, but will be more fully explored next season.

What is known as the Canyon tunnel was driven 117 feet, following a vein-cropping in Montana creek, south-east of the old *Montana* vein, and striking westerly toward it. No commercial ore was encountered and a crosscut to the north-west failed to cut the *Montana* vein. The continuation of the tunnel 150 feet to the south-west should pick up the ore-shoot, from which the above-mentioned shipments were made, in the *Montana* vein at an additional vertical depth of 80 feet.

Another tunnel was driven on the *Peach No. 1*, the most westerly claim of the group. This is in 180 feet, following a dyke striking about N. 15° E. It was started on an ore-shoot of galena and zinc-blende averaging about 200 oz. silver to the ton, which extended about 25 feet, varying from 4 to 12 inches in width. Another 15-foot lense was encountered at 50 feet in from the portal. It is the intention of the management to continue this drivage a further 300 feet to intersect a belt of argillites lying to the north.

Altogether the results of the season's work have been gratifying and necessitates further development. The work has been under the capable supervision of Angus McLeod, who has been associated with the property for some time.

Patricia Group.

(*See* 1922 Report.) The work on this group each year by the owner, H. C. Magee, consists of exploratory surface work along the mineralized belts on either side of a big dyke high up in the bluffs and the continuation of the tunnel from the foot of the bluff. This tunnel follows a small quartz-filled fissure nearly a foot in width lying in a granite spur from the main Coast range. The quartz is mineralized with galena and pyrite, solid sulphides in places, in which the chief value is gold, the galena carrying very little silver. It is now in 115 feet and will eventually penetrate the granite and presumably intersect the dyke mentioned and its flanking mineralized belts.

Work was done on several other properties in this section during 1925, the more important being: *Engineer* group, owned by Geo. Bunn, of Stewart (*see* 1921 Report); *Washington* group, owned by R. E. Lundvall, of Hyder, Alaska, on the South fork; *Aberdeen* group, owned by H. C. Magee, of Stewart, and associates, situated adjoining the Porter-Idaho on the North fork; and the *Dominion* group, situated on the east side of the North Fork glacier opposite *Porter-Idaho*, owned by Geo. Brown and associates.

BEAR RIVER SECTION.

This includes all the Bear River valley and tributaries thereto from Stewart north to the Bear-Nass divide.

The year has been one of extraordinary activity in exploration and development work in this section. About twenty-five companies have had properties under operation during the year, of which about ten will continue throughout the winter.

Inevitably a number of properties of questionable merit have been put on the market and stock-selling done on unreliable statements emanating from the promoting prospector and his partner, the prospecting promoter.

The result of all this exploration-work is beginning to become evident in small shipments of ore from different properties and it is only fair to assume that a number of these properties will develop into important producers. The successful outcome of the work on many of these properties will depend to a considerable extent upon the degree of success in financing.

The *Dunwell* is reorganized, operations resumed, and shipments are to be made during the winter. The *Silverado* is looking very promising again. The *Lakeview* has resumed work. They are well equipped and have very promising ground to explore. The *Emperor* is developing with success. The Victoria Mines has some very interesting and promising development-work ahead. The *L. & L.* has been shipping ore and requires further development. The *Ore Mountain* has several showings worth exploration. The *George Copper* is now in a position to warrant extensive development. The *Red Top* has some promising showings. The *Argenta* merits work. The *Terminus* unfortunately closed down at a critical stage. The *Independence* promises to develop into an important milling property. The *Bayview* has acquired the *United Empire* and is developing well. Altogether this is a promising array of properties for one section.

The upper valley is seriously handicapped by the impassable condition of the Bear River road above Bitter creek.

Silverado Mines, Ltd.

This company was incorporated in September, 1924, with a capitalization of $500,000, divided into 500,000 shares. The registered office is in the Pemberton Building, Victoria. The holdings of the company now consist of the following claims: *Rainier Fraction, Silver Bow No. 3 Fraction, Climax, Glencarn, Renown, Iron Hill, Contact Fraction, Canyon, Silver Bow No. 1, Silver Bow No. 2, Silverado Fraction, Silverado No. 4, Silverado No. 4 Fraction, Fortune, Ariel, Tram Fraction, Ariel Fraction, Fortune Fraction,* and *Silverado No. 3*—nineteen claims altogether, which were surveyed this summer and Crown grants applied for. The property has been described in 1921, 1922, and 1923 Minister of Mines' Reports and therefore there is no need to go into details of the old workings.

This year a storehouse was erected at tide-water and a good horse-trail built from there to connect with the old trail up the hill. Work was continued on the upper showings, where practically all the development-work has been done since 1919. This, however, proved very disappointing. Just south of the upper camp a badly oxidized quartz vein about 2 feet in width had been exposed by stripping and open-cutting for 100 feet, from which gold values up to $30 a ton had been obtained. The vein strikes easterly into the hill and lies very flatly. A short crosscut tunnel cut the vein at small depth and a drift was being run on it for 50 to 60 feet to get under the best showing on the surface. This work also giving unsatisfactory results, all the upper workings were abandoned and the camp moved down to the lower camp. From here a trail was built along the side-hill to the lower claims of the group and work started on some interesting croppings. The "Discovery" ledge was drifted on for 35 feet, striking N. 70° W. and dipping about 60° S.W. It is from 4 to 6 feet in width and assays gave $14 to $60 in gold and silver to the ton. About 16 feet in the tunnel exceptionally high gold and silver values were found at the intersection of a small cross-fissure.

The size of the vein and values were so encouraging that it was decided to run a crosscut tunnel, to cut the vein at a vertical depth of 165 feet, from a point safe from snowslides. This tunnel is estimated at 400 feet, of which about 100 feet had been accomplished at the end of 1925.

Gold Ore Mining Co., Ltd.

This company was organized in February, 1925, with a capitalization of $500,000, divided into 5,000,000 shares of the par value of 10 cents each. The registered office was in the Rogers Building, Vancouver. Stock was immediately put on the market at 8 cents a share, at which price the property should have been paying dividends instead of being a very questionable prospect. The holdings of the company consisted of the *Eagle* group of four claims—*Eagle No. 1, Eagle No. 3 Fractional, Eagle Fractional No. 4,* and *Babe No. 2*—owned by J. J. Haahti, of Stewart, and partner, H. Hill, and situated east of the mouth of Bear river and north of the *Silverado.* The company also had an option on the *Morning Star* group on Glacier creek, which, however, was not exercised.

Of the *Eagle* group, the *Eagle No. 1* expired in July, 1925; the *Eagle No. 3 Fractional* and *Babe No. 2* ran out in June, 1925, and were restaked by the original owners, leaving the company one fractional claim—*Eagle Fractional No. 4.* This is a convincing point to consider when the suggestion is made that all claims should be Crown-granted before the incorporation of a company on them is allowed.

The predominating country-rock is greenstone, McConnell's Bear River formation. There are two parallel veins on the claims about 400 feet apart, striking easterly into the hill, which have been exposed by open-cuts at about 3,200 feet elevation. The south vein is quartz mineralized sparingly with pyrrhotite and traces of galena, with an occasional small bunch of pyrrhotite. A sample of the sulphides was evidently assayed, for the statement that "open-cuts on these veins at different distances have shown an average of better than $30 to the ton in gold, silver, and lead." I took a sample of the best ore, clean pyrrhotite, with a little galena, which gave 40 cents in gold and $27.65 in silver to the ton, but it is absurd to call it an average sample, as there is only a small patch here and there and could not even be sorted out. An average sample across 54 inches, the face-width of the upper open-cut, assayed 20 cents to the ton in gold, $3.43 to the ton in silver at 70 cents an ounce, and 1.61 per cent. lead, which is negligible.

The north vein shows about 9 feet in width of quartz sparsely mineralized with pyrrhotite; a chipped sample across this assayed 20 cents in gold and 7 cents in silver to the ton. I therefore considered the prospecting and advertising statements of this company utterly misleading and not in accordance with the facts found on the property, and reported the matter to the Minister of Mines.

Phoenix Silver Mines, Ltd.

This is a 1924 incorporation, with a capitalization of $500,000, divided into 2,000,000 shares, with its registered office in the Union Bank Building, Victoria. The holdings of the company consist of ten claims, formerly owned by the Portland Canal Tunnels Company, Limited, and Crown-granted in 1914. A portion of the old tunnel, though not the portal, driven by the Tunnels Company is in the *Jennie* and *Melba*, which was about all the work that had been done on the property until acquired by the present company.

This year a considerable amount of surface work was done under the supervision of A. J. Gaul, M.E. In an effort to trace out some of the veins occurring in the Portland Canal fissure-zone, Mr. Gaul reports that veins were exposed in several places, in each case of fair width and mineralization.

The No. 1 vein crops on the east side of Big Gulch creek, near the middle of the *Olga*, a sample across 4 feet of which gave a total of $18.26 to the ton in gold, silver, lead, and zinc, the last valued at $11.28 a ton. No. 2 vein, on the *Go Between Fraction*, is well defined and mineralized with pyrite. Another 4-foot vein on the south end of the *Olga* will be further explored.

There are two veins cut in the long tunnel, the *Melba* and *Lucky Boy*, which should extend into the Phoenix ground. The former is the main vein of the Portland Canal Mining Company. It dips at 35° easterly and it remains to be demonstrated whether it crops on the Phoenix ground far enough from the western boundary of the Portland Canal Mining Company to ensure tonnage. If the vein disclosed by the work of 1925 about the middle of the *Olga* should prove to be the *Melba* vein and commercial ore-bodies found in it, it would not only be of importance to the Phoenix, but would revive the Portland Canal Mining Company, into whose ground it would dip at considerable depth.

Mr. Gaul considers the results of the season's work sufficiently encouraging to recommend utilizing diamond-drilling for further exploration.

Mimico Mines, Ltd.

This company was incorporated in July of this year with a capitalization of $1,000,000, divided into 1,000,000 shares, with the registered office in Vancouver. It acquired the *Mimico* group of four claims—*Mimico*, *Mimico No. 2*, *Riveteer*, and *Second Relief*. These are situated on the South fork of Glacier creek, about 1½ miles from the Portland Canal concentrator, and owned by H. McClymont, of Stewart, and associates. The showing is a small quartz vein in argillite country-rock. It is exposed in an open-cut across the trail about 20 feet long, showing the vein to be about a foot wide, consisting in places of solid sulphides of iron, lead, and zinc. Considerable work has been done in a tunnel cutting this vein at a depth of about 50 feet, which I have not examined. No work was done on the property during 1925.

Albany Mining Co., Ltd.

This company was incorporated in October, 1925, with a capitalization of $900,000, divided into 900,000 shares, with its registered office in Vancouver, to take over the *Albany* group, consisting of the *Albany*, *Raven*, and *Lucky Boy Fraction*, situated on the South fork of Glacier creek, on the old *Ben Bolt* trail. The property has been held for a number of years by J. Watkins, of Stewart. The country-rock in the vicinity is argillite, in which it is stated several veins have been disclosed. I have never examined the property, though I was over it this year, but in the absence of the owner only saw a couple of open-cuts. I understand that considerable surface work has been done, resulting in the exposure of ore sufficient to give prospective merit to the undertaking. A good log camp was built this summer and work commenced about the first of December, to be carried on all winter.

Union Silver Mines, Ltd.

This company was incorporated in March of this year with a capitalization of $1,000,000, divided into 1,000,000 shares, with its registered office at 628 Fort Street, Victoria. R. G. Christy is the secretary. The *Last Chance* group, situated on the North fork of Glacier creek, adjoining the *Columbia* on the west, was acquired by the company from the owners, D. Kimball and C. F. Harrison, of Stewart. The three claims, *Last Chance No. 1*, *Last Chance No. 2*, and *Last Chance No. 3*, form the group.

Some work had been done in former days, consisting of a tunnel to the west from the creek-bed, about 200 yards up the North fork from the bridge. This tunnel has now been driven 80 feet in augite porphyrite, which occurs here as an intrusive mass. At 50 feet in the tunnel a small bull-quartz vein was encountered, cutting diagonally across the tunnel, which was followed for

45 feet to the north-west, showing its strike to be N. 70° W. (mag.) and the dip 50° N.E. The quartz is not mineralized and this showing has little prospective value.

Rush Columbia Mines, Ltd.

This company was incorporated in April, 1925, with a capitalization of $1,500,000, divided into 1,500,000 shares, with its registered office in the Winch Building, Victoria. There are two groups of mineral claims acquired by the company from W. W. Rush and A. Bagg, old-time prospectors in this section—the *Columbia* group of six claims, consisting of the *Columbia* and *Evening Sun* (both Crown-granted) *Nonesuch*, *Summit Fraction*, *Sentinel*, and *Salient Fraction*, and the *Gem* group of three claims, consisting of the *Gem*, *Gem Extension*, *Al-Ki*, and *Mother Lode Fraction*. The *Columbia* group adjoins the *L. & L.* on the west. The *Columbia* and *Evening Sun* are two of the earliest stakings in the Portland Canal country, having been located by A. Bagg in 1905.

A great deal of work has been done, especially on the *Columbia-Evening Sun* vein, which crops for hundreds of feet on both sides of the Middle fork of Glacier creek. Several small shipments of high-grade ore were made in the earlier days, secured chiefly from small lenses and pockets on the surface. Where any depth has been obtained under these surface enrichments it has demonstrated that the ore does not go down. The longest tunnel, over 90 feet, shows only small stringers of high-grade ore in places, though the vein is continuous and well defined throughout.

There are no doubt small bunches of shipping-ore on the surface, but not sufficient to assure steady shipments and the development of the property without outside capital.

L. & L. Glacier Creek Mines, Ltd.

(*See* previous Reports of Minister of Mines.) This company was incorporated in April, 1924, with a capitalization of $250,000, divided into 1,000,000 shares, the office of the company being at 414 Pender Street West, Vancouver. Its holdings consist of three claims—*L. & L. No. 1*, *L. & L. No. 2*, and *L. & L. Fraction*—which were purchased outright from the estate of J. Lockwood. The claims are situated on the North fork of Glacier creek, about 4 miles from the wagon-road and 8 miles from Stewart. Crown grants were obtained for them in September, 1925.

In view of the fact that the property was in a position to ship early in 1925, recommendation was made for repairing the trail and partially relocating it to eliminate grades impossible for ore-packing. About 1,000 feet of trail was built with the grant from the Mines Department, but as it starts and ends nowhere it is of no benefit whatever.

Work done in 1925 consists of the continuation of the upper or No. 2 tunnel and the driving of a raise through from No. 1 to No. 2 tunnel, a distance of about 70 feet. Ore was encountered in the raise just above the No. 1 tunnel and continued all the way through, indicating an important ore-body between the two levels. A comfortable camp was completed this year, blacksmith-shop and ore-sorting shed built at the mouth of No. 1 tunnel, and 57 tons of ore shipped. The returns of the last shipment of 12 tons had not been received at the end of the year and are therefore not included in the output for the year. The returns, less smelter deductions, were $112 a ton, practically all silver values. The excessive cost due to transportation facilities cuts the net profit a ton pretty low and it has therefore been decided to discontinue shipping until such time as cheaper transportation is provided. In the meantime development-work will be continued during the winter. A lower tunnel, gaining an additional 80 feet in depth, has been started on the vein and further exploration-work will be carried out on the No. 1 level.

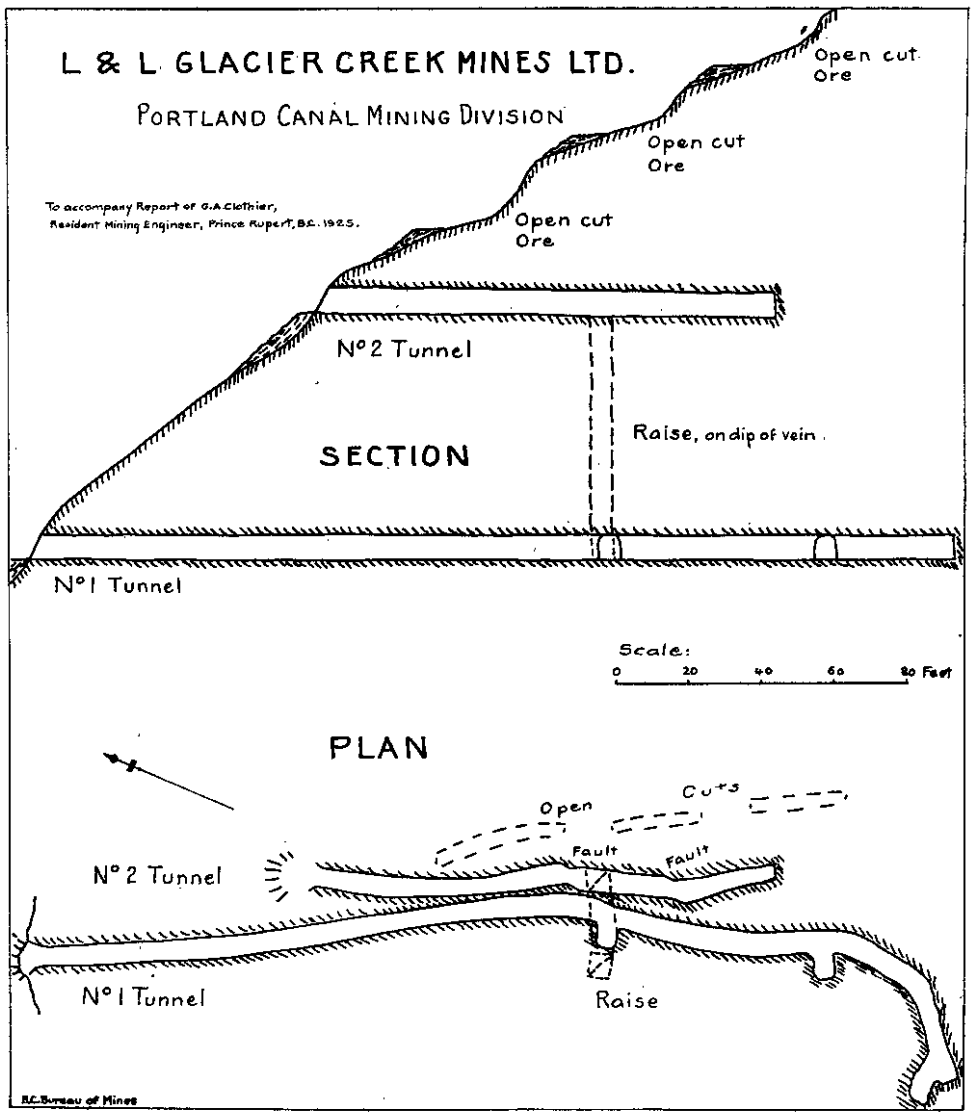
Frank Breeze has been in charge of the work from its start and under the existing conditions has made a good showing.

Sunshine Group.

(*See* 1923 Report of the Minister of Mines.) There are two claims, *Sunshine* and *Sunshine No. 1*, in this group, owned by Fred Young, of Stewart, and the estate of Godfrey Anderson. The property is situated on the west side of the glacier at the head of the North fork of Glacier creek. The country-rock is probably the border of the augite-mass in which the *L. & L.* and *Columbia* groups lie. There are a number of isolated outcroppings on the *Sunshine*, but not enough work has been done to correlate them. The main showings outcrop on the steep face of the hill overlooking the glacier, one of these showing a width of 8 feet, containing a fair percentage of chalcopyrite. A few hundred feet up the hill are two other outcroppings showing chalcopyrite, which are unexplored.

Down the hill and overlooking the glacier there is a small seam of ore assaying high in silver and zinc, from which 2 tons was shipped by the owners in 1922.

The property was under option in 1925 to H. Houston and J. Peterson, of Vancouver, who supervised considerable exploration-work, consisting of open-cuts on the copper-showings and a tunnel on the high-grade seam. A large cut shows bunches of mineralized quartz, but whether it is a vein is speculative. Several smaller cuts trace the vein, showing above the old cabin, down the hill for 200 or 300 feet, showing little or no mineralization and therefore of uncertain prospective importance.



The drift on the high-grade seam lower down the hill was run, I think, about 80 feet (I did not make a note of the exact distance), but no ore of importance was found. This vein is considered to be the northern extension of the *L. & L.* vein now under development, but I think this is questionable. Altogether no conclusive information has been gained of the property.

Title to this property is now held by the Sunshine Mining Syndicate.

Emperor Mines, Ltd. This company was incorporated in December, 1924, with a capitalization of $1,500,000, divided into 1,500,000 shares. Its registered office is in the Standard Bank Building, Vancouver. The claims owned by the company are situated north of the *Lakeview* and were purchased from Jas. McKay, of Stewart, the

original staker. There are three claims and two fractions—*North Line*, *North Line Fraction*, *South Line*, *South Line Extension*, and *Flat Fraction*—known as the *North Line* group.

There is a first-class trail completed through to the *Lakeview* this year from the Bear River wagon-road. The portion from the *Lakeview* to the Emperor camp is in bad condition. A trail was recommended last year from the *Dunwell* road to serve the *Lakeview*, Emperor, and claims beyond to the *Sunshine*, but was only constructed as far as the *Lakeview*. It will in all probability be extended next season through to the Emperor camp, which is at 2,950 feet elevation.

The country-rock, I think, would be classed as tuff. The showing is a brecciated vein, composed of quartz and country-rock more or less mineralized with pyrite, up to 20 feet in width. On the hanging-wall side is a small quartz vein varying from a few inches to a foot in width, in which very good values have been obtained. The main portion of the vein, however, is low grade, probably averaging between $10 and $12 to the ton in gold and silver.

At an elevation of 3,130 feet the first tunnel was driven 120 feet, cutting the vein at right angles at a depth of about 80 feet. The vein here is 16 feet or more in width, as the foot-wall was not reached. Drifts were run north 50 feet and south 25 feet along the hanging-wall of the vein, which strikes N. 15° W. (mag.) and dips from 80° to 85° W.

As no further depth could be obtained in drifting on this level, it was decided to start a crosscut tunnel at 2,880 feet elevation, which would obtain a depth of about 330 feet on the vein, intersecting it several hundred feet south of the upper tunnel, in a distance of about 500 feet. This work was started in the spring of 1925 and had been driven about 25 feet by the end of July, through the overburden to the solid rock. This of course had to be timbered and was slow work. In the meantime a log building 16 by 32 feet, covered with corrugated iron, was built at the mouth of the tunnel, housing a machine-shop and a 220-cubic-foot air-compressor driven by a 45-horse-power Seffle semi-Diesel engine. An exceptionally fine camp has been constructed, the main building, built of logs, being 16 feet wide by 72 feet long, and containing a well-appointed kitchen 16 by 16 feet, dining-room 12 by 16 feet, bunk-house 16 by 30 feet, and a dry-room 14 by 16 feet equipped with shower-baths and hot and cold water. The bunk-house section contains eight double-deck iron beds with mattresses. Another log building, 14 by 42 feet, has three rooms, used as manager's residence and office. Everything is most convenient and comfortable and with a small addition to the dining-room could accommodate forty men.

The mining equipment includes 3,000 feet of rails, one water Leyner machine and three jack-hammers, hoist, steel-sharpener, 2½ tons of machine-steel, 3,000 feet of assorted pipe, black-smithing outfit, drill-press, a Cameron sinking-pump, two ore-cars, 10,000-gallon-capacity oil-tank, 150 drums of crude oil, etc.; in all a very complete equipment for extensive development.

Since the installation of the compressor good progress has been made with the tunnel. Early in October a 5-foot vein was encountered at 280 feet from the portal, well mineralized with zinc-blende and pyrite. About the middle of November the big vein was struck at 470 feet from the portal and crosscut for 21 feet. The vein here shows about the same as where crossed in the upper tunnel, the manager stating that it will average a milling-grade ore. It is being drifted on to the north to get under the point at which it was cut in the upper tunnel. A raise will there be run for prospecting and ventilating purposes. The drift will be approximately 400 feet and the raise 325 feet. While the information gained so far is not conclusive, it is sufficient to give important prospective merit to the property as a milling enterprise.

The advertising statement made early in the year that there were $2,000,000 worth of ore in sight was of course unjustified and decidedly misleading.

Operations are under the very efficient supervision of G. Seiffert.

Superior Mines, Ltd.

This company was incorporated in April of this year to acquire the ground adjoining the Emperor holdings on the north, through which the Emperor vein extends. It is capitalized at $500,000, divided into 1,500,000 shares, with the registered office in Vancouver. The four claims, *B.C.*, *O. & H. No. 1*, *O. & H. No. 2*, and *Albert*, were purchased outright from the owners, H. Horstman and associates. No attempt has as yet been made to explore the Emperor vein crossing this ground. A little work, consisting of shallow open-cuts and a 20-foot tunnel, has been done on a cross-vein at some distance from the Emperor vein and at 3,400 feet elevation. The showing here consists of some mineralization in small shear-veins lying on either side of a light-coloured, fine-grained dyke, the tunnel being on the foot-wall side of the dyke. High values in silver are claimed to have been

found and form the reason for driving the tunnel. The intersection of this vein with the main Emperor vein should be an interesting point for exploration-work.

Goldie Group. The claims in this group are *Goldie*, *Goldie Nos. 6*, *7*, *8*, *9*, and *10*, situated just north of the Superior Mines, Limited, ground. They are owned by W. Tooth, Kenny McLeod, and L. Howse, of Stewart, who staked them in 1924. This year's assessment consisted in the driving of a shallow tunnel about 20 feet on a small quartz vein mineralized with galena. Two tons of clean galena was taken out in the tunnel and shipped. Assays run 80 per cent. lead and 84 oz. silver to the ton. As the showing is on the summit, further depth on the vein will necessitate sinking for exploration-work.

Lakeview (Stewart, B.C.) Mines, Ltd. This company was incorporated in April, 1924, with a capitalization of $500,000, divided into 500,000 shares, with its head office at Victoria. The property consists of the *Lakeview* group, the claims in which were Crown-granted this year—namely, *Lakeview No. 1*, *Lakeview No. 2*, *Lakeview No. 3*, and *Silver Bell* Fraction, staked and owned by Jas. McKay and Charles Bibeau, of Stewart; the *Lakeview Fraction* and an interest in the *Riverside No. 1*, *Riverside No. 2*, and *Riverside No. 3 Fraction*.

The *Lakeview* group lies east of and adjoining the ground of the Dunwell Mines, Limited, and the remaining claims lie between the *Lakeview* group and *Glacier* creek. It is ideally located for mining and shipping, being about 2 miles from the main Bear River wagon-road and 5 miles from tide-water. The country-rock is McConnell's Bitter Creek formation, composed mainly of argillites, tuffaceous rocks, and bands of limestone.

Before being acquired by this company the property had been considerably explored in attempts to pick up the vein and values at depth, as indicated on the surface.

R. F. Hill, M.E., was appointed mine manager last year and very ably handled the enterprise until recently, when he accepted a position in the Revelstoke country. He will, however, visit the property occasionally in a consulting capacity.

Briefly, last year's work consisted of the extension of the work previously done on the 100-foot level. The ore was located and drifted on, proving the shoot to be 65 feet long, with values consistent with those found on the surface. Extensive surface work was also done on the extension of this vein which proved it of sufficient merit to warrant obtaining more depth, for which purpose a crosscut tunnel was decided upon on the 300-foot level and started in November on hand-work contract. It was estimated that it would require a drivage of 580 feet. A new camp convenient to this work was built to accommodate twenty men.

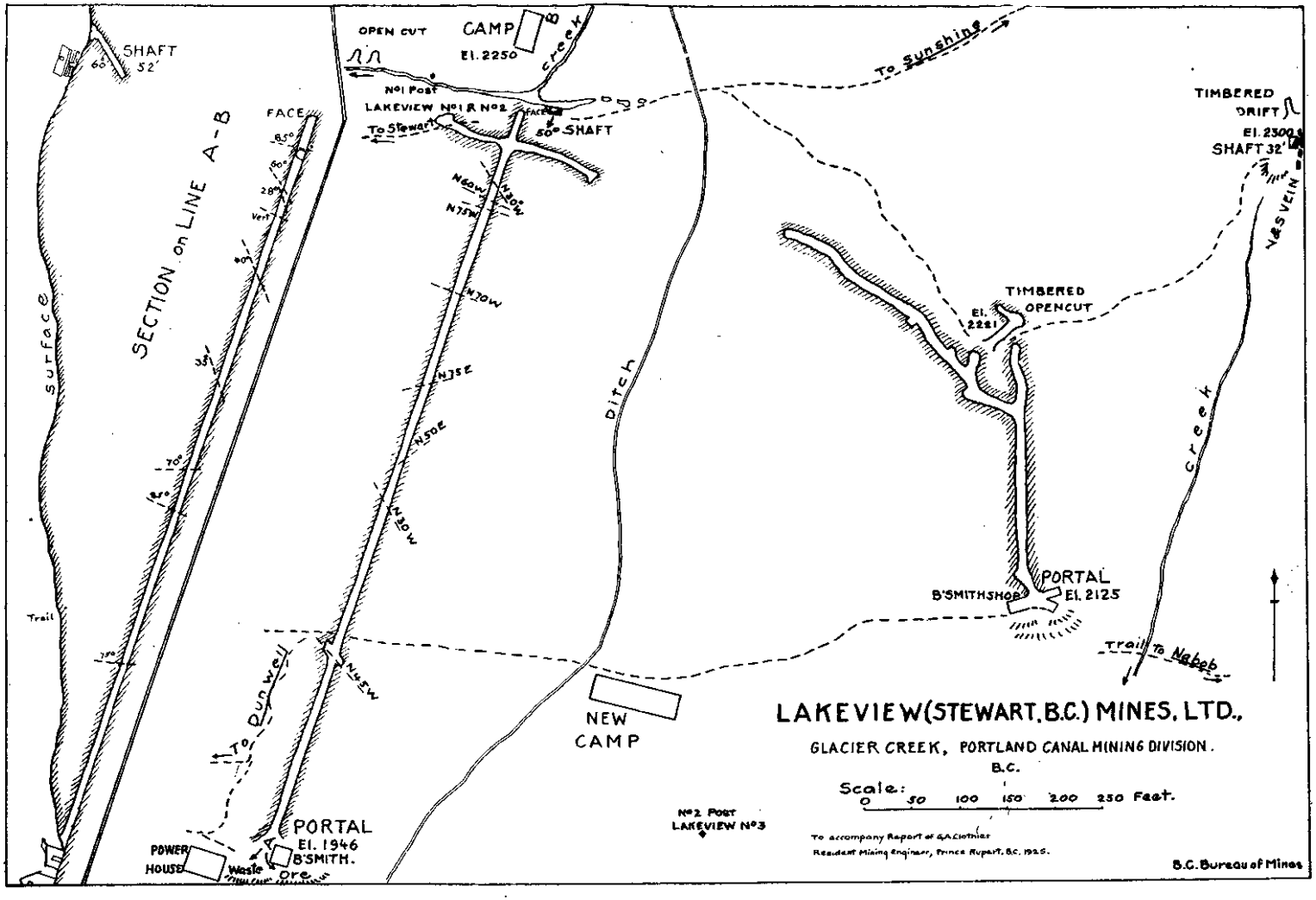
A compressor plant was taken in, in 1925, over the snow and installed. It consists of a 355-cubic-foot (2-drill) Canadian Ingersoll-Rand compressor, 55–60-horse-power semi-Diesel, Vickers-Petter engine, and altogether a very efficient plant for the work intended. It was put in commission early in April, the contractors having made about 240 feet in the tunnel.

At about 180 feet from the portal a small vein from 6 to 12 inches wide was crossed, four samples from which assayed from 40 cents to $6 to the ton in gold, 5 to 14 oz. to the ton in silver, 1.5 to 26 per cent. lead, and up to 26 per cent. zinc. This will bear investigating later. From this point several small mineralized quartz veins, all carrying more or less values, have been encountered.

The main or cabin vein was cut at 751 feet from the portal of the tunnel and the tunnel continued a further 30 feet. A drift was then run 95 feet east and another to the west for 80 feet, making a total of 175 feet of drifting on the vein, directly under the surface work on the vein at the old camp. This work shows small lenses of ore in the vein for nearly the whole distance, carrying values ranging from a few ounces to high-grade silver ore, and I think it very encouraging. A raise through to the surface from here would be good exploration.

The property is at the stage now where the expenditures for plant and dead-work will have every chance of showing results. Drifting on the vein with raising, where ore is encountered, may be expected to develop shipping-ore. The east drift will be well under the ore-shoot exposed in the No. 1 level, with a drivage of 250 feet, and a raise through from No. 3 level to No. 1 level and continued through to the surface on the same ore-shoot should develop an extensive and profitable ore-body. The north-south vein should also be explored from the upper tunnel.

Everything considered, the prospective merits of the property have been greatly increased with the work done to date. Operations closed down early in the summer, but I am informed that the affairs of the company have been reorganized and that future development is assured. Work was resumed early in December and will be continued through the winter.


LAKEVIEW (STEWART, B.C.) MINES, LTD.,
GLACIER CREEK, PORTLAND CANAL MINING DIVISION.
B.C.
Scale: 0 50 100 150 200 250 Feet.
To accompany Report of G.A. Clothier
Resident Mining Engineer, Prince Rupert, B.C. 1925.
B.C. Bureau of Mines
SHAFT 52'
SECTION on LINE A-B
surface
Trail
FACE
OPEN CUT
CAMP
El. 2250
creek
No1 Post
LAKEVIEW No1 & No2
To Stewart
50° SHAFT
N60W
N30W
N75W
N70W
N75E
N50E
N30W
N45W
Ditch
To Sunshine
TIMBERED DRIFT
El. 2300
SHAFT 32'
N&S VEIN
TIMBERED OPENCUT
El. 2221
creek
PORTAL
El. 2125
B'SMITHSHOP
Trail To Nabob
NEW CAMP
To Dunwell
PORTAL
El. 1946
B'SMITH.
POWER HOUSE
Waste
Ore
No2 Post
LAKEVIEW No3

A first-class horse-trail, wide enough for a winter road, was built through from the *Dunwell* camp to the lower tunnel of the *Lakeview*, about 1½ miles, with funds granted by the Department of Mines.

Dunwell Mines, Ltd.

(*See* 1924 Report of Minister of Mines.) This company was incorporated in 1922 and is a specially limited reorganization of the Nass River Lands, Limited, which was incorporated in 1913. The capitalization of the present company was $350,000, divided into 350,000 shares, with the head office in that of the Stewart Land Company, Limited, Pemberton Building, Victoria. The share capital of the company was increased this year to $700,000, of 700,000 shares, to provide treasury funds for the prosecution of development-work and necessary plant to place the property on a production basis.

The property was closed in December, 1924, and did not resume operations, except for surface exploration, until about the first of October, 1925, when M. Little, M.E., was appointed mine manager. In the meantime the underground workings have been thoroughly sampled, giving definite evidence for the valuation of the ore and its treatment.

During the summer extensive surface exploration was carried on under the supervision of John Stewart. The result of this work has been very gratifying and has greatly added to the prospective value of the property.

At the time I was on the property, about the first of August, a vein had been exposed on the surface on the *Sunbeam* claim, which is the most northerly of the claims, for a distance of over 800 feet by open-cutting and stripping. The most southerly point on this exposure is about 1,000 feet north of the face of the No. 3 tunnel of the *Dunwell* workings and at approximately 200 feet greater elevation. The vein appears to vary from 1 to 6 feet in width, showing in several places heavy native silver and assuring a very fair average value. I am authentically informed that the northern extension of the main *Dunwell* vein was disclosed about 300 feet east of and parallel lto the above vein. Open-cuts across the vein gave very satisfactory values.

By drifting ahead on the No. 3 tunnel level a very substantial depth (over 350 feet) will be attained under the recent discoveries. A crosscut from this tunnel to the west vein will be a very economical way of opening it up.

Since the resumption of work the flume has been reconstructed and protected with snow-shed at the intake; the pipe-line from the penstock to the water-wheel has been replaced by a larger one; the compressor and air-lines overhauled and underground work started. A raise is being driven from No. 4 tunnel level to the No. 3 for ventilation and ore-chute. The No. 3 tunnel is being continued north. Three raises are being put up from the No. 3 level. Over 100 tons of ore has been sacked from this work and will be shipped as soon as winter road conditions permit.

A concentrator is contemplated, work on which will probably commence as soon as the snow is gone. It will be situated near Glacier creek at the foot of the hill and fed by means of an aerial tramway about 4,000 feet long from No. 4 tunnel.

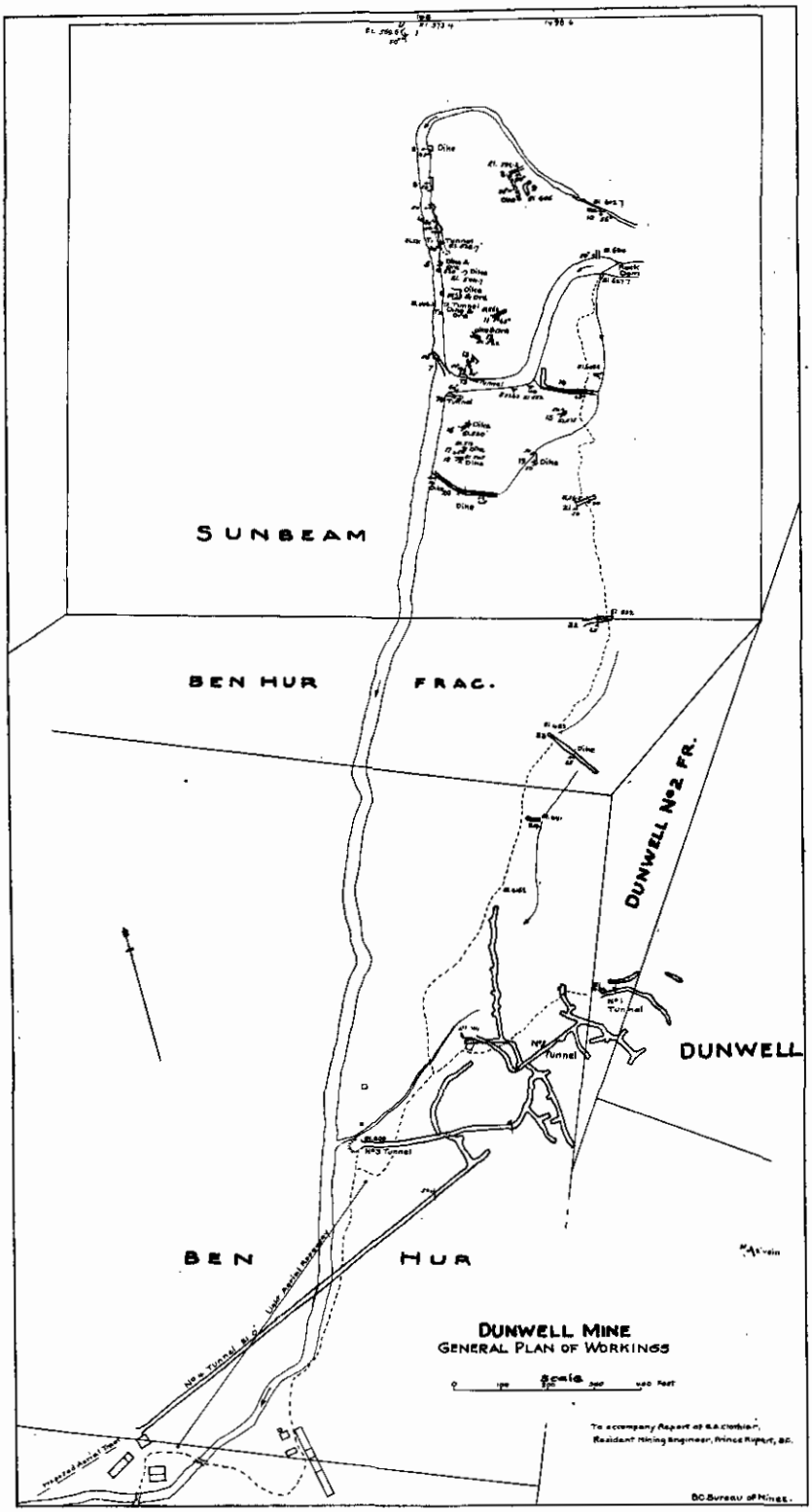
It is stated that practically the whole issue of new stock of 350,000 shares has been disposed of, in which case the company is in good shape financially to advance to the profit-making stage.

Glacier Creek Mining Co., Ltd.

This is an old incorporation of 1909 with a capitalization of $500,000, divided into 1,000,000 shares, the registered office being in the Stewart Land Company's office in the Pemberton Building, Victoria. There are six claims in the property—*Nellie V.*, *Riverside*, *Last Chance*, *Lucky Boy*, *Lulu*, and *Victory*—lying south of and adjoining the *Dunwell*. The old workings up to 1912 consisted of a crosscut tunnel 264 feet long, driven toward cutting the two veins, "central" and "green," of the north-south series of veins exposed on the *George E.* claim to the north. Nothing further was done until last year, when the old camp was reconditioned, an air-line laid from the *Dunwell* line, and the mine equipped. Work was proceeded with in the driving of the crosscut tunnel, cutting the central vein at 325 feet and the green vein at 455 feet from the portal. The central vein was drifted on for 84 feet and the green vein for 90 feet, no ore of importance being found in either. Further exploration has been done by diamond-drilling, from which satisfactory results are reported.

Victoria Mines, Ltd.

This company was incorporated in September, 1924, and is capitalized for $500,000, divided into 500,000 shares, with its head office in the Winch Building, Victoria. The property is composed of the *Dandy* group—*Dandy No. 1*, *Dandy No. 2*, *Star No. 1*, and *Star No. 2*—partially the old *Main Reef* property, lying north of and adjoining the *Dunwell* and owned by H. Horstman, of Stewart. Early in 1924 the


SUNBEAM
BEN HUR FRAC.
DUNWELL No 2 FR.
DUNWELL
BEN HUR
No 1 Tunnel
No 2 Tunnel
No 3 Tunnel
No 4 Tunnel
Dike
Rock Dam
DUNWELL MINE
GENERAL PLAN OF WORKINGS
Scale
To accompany Report of S.A. Clothier, Resident Mining Engineer, Prince Rupert, B.C.
B.C. Bureau of Mines.

property was optioned by R. W. Martin and Eastern associates, who did considerable work in surface cuts and a tunnel of 70 feet. After the organization of the company work was begun on a crosscut tunnel at 1,400 feet elevation, intended to cut the northern extension of the *Dunwell* series, if they extended so far. The tunnel was driven about 90 feet by the end of 1924.

In 1925 the claims were surveyed and further exploration-work was carried on under the management of A. Gaul, M.E. The old *Main Reef* vein (No. 1) was picked up on the east side of the creek, south of the old No. 2 tunnel. This vein was also traced north to the north-west corner of the *Dandy No. 2* claim, a distance of several hundred feet. A shallow tunnel was driven on it, but did not get below the surface oxidation. Another was started 100 feet lower and driven 32 feet, leaving about 20 feet farther to go to cut the vein.

With the discovery of the vein and high-grade ore on the *Sunbeam*, adjoining the *Dandy No. 1* claim on the south, the crosscut tunnel on the *Victoria* acquired great prospective importance. The *Sunbeam* vein was traced right up to the *Dandy No. 1* south line; in fact, there is an open-cut about 6 feet from the line. Open-cuts were put in on the *Victoria* ground along the strike of the *Sunbeam* vein, which were unsatisfactory on account of the very heavy overburden and surface oxidation.

The No. 4 crosscut tunnel was advanced from 90 to 430 feet without cutting the *Sunbeam* vein, though the last 50 feet shows a little mineralization and conditions similar to that vein. There is every probability of cutting the *Sunbeam* vein within a short distance. At 246 feet from the portal a vein was crossed, which no doubt is the *Main Reef* or No. 1 vein exposed in the No. 2 tunnel, from which some ore was shipped in 1925. This was drifted on 11 feet to the north and 73 feet to the south. Mr. Gaul states that the south drift is looking promising.

The property has advanced from "possibilities" to "probabilities," but I suppose the outcome will be considered speculative until ore is actually encountered and developed in the crosscut tunnel.

Silver Ledge Mining Co., Ltd.

This company was incorporated in May, 1924, with a capitalization of $250,000, divided into 1,000,000 shares of 25 cents each. Its registered office is in the Central Building, Victoria. The company acquired the *Bull Dog* group, consisting of *Bull Dog* and *Bull Dog Nos. 1, 2,* and *3,* from H. A. Horstman, of Stewart. They are situated about a mile up the hill above Wards pass and north of the *Dandy No. 1* of the Victoria Mines, Limited. I understand that a trail was built up to the showings from the Bear River wagon-road and some surface work done in tracing the vein, under the supervision of H. Horstman.

Mayflower Group.

This group, consisting of the *Mayflower, Mayflower Fraction, Mayflower Nos. 2, 3,* and *4,* is situated west of or down the hill from the Victoria Mines claims. The group is owned by H. P. Gibson, of Stewart, who has had two men on exploration-work all summer. Mr. Gibson states that the work uncovered two new veins, one of which, striking east-west, was exposed for about 80 feet, showing from 1 to 1½ feet of well-mineralized quartz, from which good assays were obtained. Another vein on the *Mayflower No. 2* shows 6 inches of ore, assaying up to $70 to the ton in gold, silver, and lead values, in a vein-filling several feet in width. The tunnel was also advanced a short distance.

Americus Girl Group.

There are eight claims in this group—*Americus Girl, Sunlock, Sunkist, Tuxedo, Drummer Boy, Duke, Baker,* and *Le Argent*—lying on the south side of the mouth of Bitter creek at an elevation of about 1,400 feet. They are owned by Chas. Duke, Howard Campbell, and Joe Cullen, of Stewart. There is a foot-trail from the Bear River road just below the Bitter Creek bridge. The showing consists of a 4-foot vein of quartz in greenstone, sparingly mineralized with pyrite and showing traces of chalcopyrite, carrying gold values of about $3.50 a ton. At 1,650 feet elevation a tunnel has been driven on the vein for 50 feet, demonstrating its strike as 52° E. and dip about 65° W.

Just above the cabin, which is at 1,400 feet elevation, a small cross-vein has been uncovered and two cuts below the cabin show a similar vein to that in the tunnel, though I think it is a different, parallel vein. My suggestion was that stripping along the vein above the tunnel would be a much cheaper way of exposing it than drifting, for the quartz is glassy and very hard to drill and break.

Stewart Central Mines, Ltd.

This company was incorporated in June, 1924, with a capitalization of $250,000, divided into 1,000,000 shares of 25 cents each. The registered office is in the Central Building, Victoria. The properties of the company consist of ten claims on the south side of Bitter creek, about 2 miles above the bridge. The

claims are *Mauretania*, *Mauretania Nos. 1, 2, 3, 4,* and *5*, *S.D.*, *S.D. Nos. 1, 2,* and *3*, owned by B. O. Erickson, of Stewart, and associates.

I have not examined the property as there was no one in the vicinity who knew its location when I was in there this summer. I conclude from the report of the engineer who examined it for the company that there are two veins, exposed by open-cutting, on the property deserving of some exploration-work. I have not heard of any work being done on them this year.

Radio-Stewart Mines, Ltd.

This company was incorporated in April, 1924, with a capitalization of $1,000,000, divided into 1,000,000 shares of $1 each. The registered office is in the Central Building, Victoria. The ground acquired from B. Erickson and partner, of Stewart, is known as the *Radio* group, consisting of six claims—*Radio*, *Radio Nos. 1, 2, 3*, *Radio Fraction*, and *Creek*. It is situated on the north side of Bitter creek, about 4 miles from the bridge. The elevation extends from 750 feet at the lower boundary of the claims to 5,000 feet at the highest point. The claims have been surveyed. This property is, as nearly as I can judge, very probably that of the old Bitter Creek Mining Company, which operated in 1910–11. The old camp is at an elevation of 1,000 feet, to which there is a good horse-trail from the main Bitter Creek trail.

The general country-rock is McConnell's Bitter Creek formation of argillites. The lower showings near the cabin consist of three brecciated veins from 2 to 5 feet in width. The gangue is country-rock and calcite mineralized with pyrite and traces of chalcopyrite, constituting probably a low-grade milling-ore. These veins should be explored in the possibility of developing a commercial tonnage of milling-ore.

The upper showings on the *Radio No. 2*, to which there is a foot-trail from the cabin, are at an elevation of 4,000 feet. These consist of two brecciated veins outcropping in the creek. The gangue is argillite cemented with calcite, mineralized with pyrite, galena, and zinc-blende, with traces of grey copper, the pay-streak in each being from 6 to 10 inches wide and assaying up to 77 oz. in silver to the ton, 14 per cent. lead, and 8.5 per cent. zinc. These showings have prospective merit in that the ore, though small, is of shipping grade and therefore deserves development.

I am indebted to A. R. Morton, who examined the property this summer, for a map of the claims and sketch of the workings and veins.

Ore Mountain Mining Co., Ltd.

This company was incorporated in December, 1924, with a capitalization of $1,000,000, divided into 1,000,000 shares at $1 each. The registered office is in the Pemberton Building, Victoria. The company acquired the *Ore Hill* group of six claims from George Young and Henry Unwin, of Stewart, who are supervising operations. Since starting work on these claims six more have been staked, and the holdings now consist of *Ore Hill*, *Ore Hill Nos. 2, 3, 4, 5,* and *6*, *Black Bear*, *Lake Shore*, *Silver Band*, *Lead Coil*, *Lead Coil No. 2*, and *Gold Hill*. They are situated north of the mouth of Bitter creek, extending from Bear lake up the hill to an elevation of 4,750 feet. The company, assisted by the Mines Department, built a good horse-trail this spring from the main wagon-road to the camp, approximately 3 miles. A good log camp building was erected at an elevation of 3,450 feet.

The general country-rock is greenstone, or Bear River formation. At the camp a number of small veins have been exposed by open-cuts into a low bluff across a width of about 100 feet. The veins appear to be parallel with a strike of N. 60° W. There are probably ten of these veins, ranging from a few inches to an oxidized width, on the surface, of 5 to 6 feet. The sulphides, composed of pyrite and galena, carry good values in gold and silver, but no work has yet been done towards obtaining any depth to demonstrate the continuity or mineral contents of the veins.

Starting on an "iron" vein on the Bear River slope of the hill, a drift about 300 feet long would obtain good depth under these surface showings and a crosscut would then demonstrate whether they amounted to anything or not.

At 4,400 feet elevation a tunnel was faced up, which exposed a vein 2 feet wide, of which 18 inches is quartz sparingly mineralized with pyrite and traces of galena, and the balance of 6 inches of decomposed material on the hanging-wall containing bunches and bands of pyrite and galena paralleling the walls, a sample of which assayed 80 cents to the ton in gold, 32 oz. in silver to the ton, and 26 per cent. lead.

Just to the north of this vein there is a wide porphyritic dyke, which can be traced for hundreds of feet up the hill, on either side of which small veins similar to the one mentioned have been exposed by open-cutting and stripping. The highest of these, at 4,750 feet, on the

south side of the dyke, shows a mineralization of galena and pyrite in badly decomposed material to a width of 6 to 8 feet.

There is of courrse not enough work done to furnish conclusive evidence, but the surface showings give some prospective merit to the property.

I regret that information is not available as to the results obtained from later work on these upper showings. The work has been efficiently handled by Young and Unwin and the investor is assured of a run for his money.

Ruby Silver Mines, Ltd. (*See* 1924 Report.) This company was incorporated in April 1924, with a capitalization of $350,000, divided into 350,000 shares of $1 each. The registered office is in the Pemberton Building, Victoria. The company holdings consist of two groups of Crown-granted claims—the *Ruby Silver* group of six claims and the *Ruby Silver Extension* group of four claims—situated on Mosquito creek. The first group was acquired from A. W. P. LeSueur and the latter from Mr. LeSueur and associates. The camp is at 1,225 feet elevation, about 600 feet above the Bear River road, from which there is a good horse-trail. Some work was done in 1925, but the property closed down early in the summer and had not resumed at the end of the year.

Stewart High Grades, Ltd. This company was incorporated in March, 1924, with a capitalization of $1,000,000, divided into 1,000,000 shares of $1 each, with its registered office in the Hamley Building, Victoria. There are three properties under option to the company, the first consisting of the five claims Crown-granted this year—*Tacoma, Kent, K.P., Lucille No. 1,* and *Beth*—adjoining the *Bayview* on Mount Dolly. The second is the *Grey Copper* group (*see* 1917 Report) of three claims—*Grey Copper, Grey Copper Nos. 1* and *2*—situated on the south side of Bear river on the first creek above the canyon. The third is the *Nonesuch,* adjoining the *Grey Copper.* I have not heard of any work having been done on these properties by the company.

The George Gold-Copper Mining Co., Ltd. This company was incorporated in April, 1925, with a capitalization of $1,500,000, divided into 1,500,000 shares, with its registered office in the Pemberton Building, Victoria. The property which the company has acquired consists of sixteen claims, situated about 6 miles up Bear river from the wagon-road, owned by W. B. George, of Stewart, and associates. The property has been described in these reports from year to year since 1918. Suffice it to say here that the property has been made accessible by a saddle-horse trail from the main Bear River trail up to the mine camp and showings, and sufficient surface work has been done by the owners during the past fifteen years to justify the conclusion that the property has real prospective merit.

The success of the work on the property depends upon the success in raising adequate finances for its development and equipment. I consider it the most attractive copper property in the district.

Montreal Group. This group is composed of six claims—*Montreal Group Nos. 1, 2, 3, 4, 5,* and *6*—located in 1925 on Beaver creek, east of Bear River divide, by Jas. Douville, F. Reva, and G. McHugo, of Stewart. The claims adjoin the *Murdock* group on the east and are about 3 miles from the divide on the north side of the valley. There is a good trail, except in places, through to Meziadin lake. The section crossing the Bear River divide needs rebuilding and down the Nass slope it should follow the north bank of Beaver creek all the way instead of crossing the creek, which makes it impassable very often for foot-travellers.

The owners are very optimistic with regard to the showing, which they state consists of four parallel veins, three of which are sufficiently close to permit of developing from one tunnel. They vary in width from 6 to 25 feet, the vein-filling consisting of pyritized calcite and quartz carrying galena, assaying up to $56 to the ton in silver and lead.

Murdock Group. The seven claims comprising this group—*Murdock Nos. 1, 2, 3, 8, 9,* and *10* and *Murdock Fraction*—were staked in 1921 by Geo. McHugo and Jas. Douville, who have done the annual assessment-work since. The claims are situated about 2 miles east of the Bear River divide, adjoining the *Montreal* group. There is said to be a promising showing of galena on the property.

Enterprise Group. This group consists of seven claims—*Enterprise Nos. 1, 2, 3, 4, 5, 6,* and *7*—which are situated on the north side of Bear river, just west of the Bear-Nass divide, and are owned by Louise R. George, of Stewart. It is the ground of the old *Lucky Frenchman* group, on which a 100-foot tunnel was driven in 1910–11 at 3,150 feet

elevation, with the object of getting under a promising-looking outcropping of chalcopyrite. The claims were staked last fall, and this year the owner built a horse-trail from the main Bear–Nass trail about half-way up the hill and continued it as a foot-trail to the old camp at 2,600 feet elevation.

The old tunnel shows some chalcopyrite, but it was not sufficiently encouraging to go ahead with. There is apparently a belt of copper ore in the bluffs above the tunnel, striking east-west, showing at the base of the bluff bunches of good chalcopyrite. In the slide also there are boulders of good ore.

West of the tunnel, at an elevation of 3,650 feet, at the head of a long rock-slide below perpendicular rock walls, there is a small flat vein a foot or two in width exposed on the surface for 25 to 35 feet. Some very high-grade float is found in the slide, but I could see nothing in the flat vein similar to it. The float assays high in silver, but a sample from the flat vein gave $1.20 in gold to the ton, 6 oz. in silver to the ton, and 9 per cent. copper. The only conclusion is that the high grade comes from a vein in the bluffs above.

Farther west on the slide are found big boulders of honeycombed and decomposed quartz as well as solid, heavily pyritized quartz, samples of which gave no gold or silver and only a trace of copper.

The property is worthy of some prospecting, but its possibilities are not very encouraging. The copper-belt would require considerable work to show whether it were worth extensive exploration or not. In this location there would have to be a big tonnage of good-grade copper ore to be attractive.

The flat vein at the head of the slide has possibilities, but the main values appear to be in copper. The heavily pyritized vein is obviously big, but seemingly of no prospective merit. The source of the high-grade float is of course purely speculative.

Red Top Group. (*See* 1920 Report.) These claims, owned by J. Conners, Jas. McNeil, and John McNeil, are situated on the north side of Bear river, about 7 miles up from the end of the Bear River wagon-road, and therefore just beyond and on the opposite side of the river from the *George*. There is a good horse-trail to the camp and on up the hill to the *Barite* on the summit, branching from the main Bear–Nass trail about a mile beyond the *George* cabin. The following are the claims: *Red Top, Red Top No. 1, Hector No. 1, Superior, Superior No. 1, Red Top Fraction, Superior No. 2 Fraction*, according to the 1924 grouping. The general rock formation is greenstone, McConnell's Bear River formation.

At 3,850 feet elevation there is an open-cut exposing a quartz-calcite vein 5 to 8 feet wide, heavily mineralized with pyrite and galena averaging probably 20 per cent. lead. The grade of the ore is 16.8 oz. silver to 70.7 per cent. lead.

At 3,500 feet elevation a crosscut tunnel is being driven to intersect this vein. Some work was done on it in 1925 and it is now in about 200 feet without having reached its objective.

East of this showing, on the steep face of the hill overlooking Cullin creek, a very promising vein has been stripped for about 100 feet. It is from 1 to 2 feet wide, of quartz heavily mineralized with galena, zinc-blende, and some chalcopyrite, stands almost perpendicularly, and strikes N. 70° E. The hill below the stripping is very precipitous and the vein would probably have to be opened up at a lower point. It is worth developing.

At the camp the copper vein showing on the surface has been cut in the crosscut tunnel which was started in 1920 by Gus Seiffert, who had an option on the property. At that time the vein, cut at a distance of 267 feet from the portal, strikes N. 50° W., dips 72° E., and is about 25 feet in width, across which an average sample would be low grade, probably less than 2 per cent. copper and little or no gold.

An option was taken on the property in 1925 by H. Quickstad, of Seattle, who promoted the *Barite* on the summit of the mountain, above the *Red Top*. A little work was done, I understand, in the upper crosscut tunnel.

Barite Gold Mines, Ltd. This company was incorporated in March, 1924, with a capitalization of $250,000, divided into 250,000 shares of $1 each. The registered office is the Campbell Building, Victoria. The property consists of three claims—*Barite, Barite No. 1*, and *Hub*—constituting the *Barite* group, and is owned by Quickstad, Hanson, and Stewart. The claims are situated on the top of the mountain, 5,100 feet elevation, above and adjoining the *Red Top* group. There is a foot-trail from the upper showing on the *Red Top* to timber-line, above which one can go anywhere.

In the course of my duties I got up to the property on August 8th and found there was a considerable discrepancy between the actual conditions and the statements set forth in the prospectus issued by the company, of which H. Quickstad, of Seattle, is the president. I therefore reported the matter to the Minister of Mines in accordance with the provisions of the "Mineral Survey and Development Act."

The country-rock in this region is the Bear River formation, or greenstone. In the immediate vicinity of the showing it is a reddish andesitic-looking rock. On the top of the mountain, at 5,000 feet elevation, there is a belt about 30 feet in width in which occurs a network of small gash-veins of barite, striking in all directions and dipping at all angles, cropping along a distance of 400 to 500 feet. So far as I could see, on the surface and in what little open-cutting had been done, there is, with one exception, no mineralization. This one exception, which is the cause of the misleading statements, is a harmless-looking hole about 2 feet wide, 2 feet deep, and 3 feet long, showing a vein about 14 inches wide, with 2 inches of galena on each side of it, of which a sample gave returns of: Gold, trace; silver, 13 oz. to the ton; lead, 29 per cent.; a total of $55.50 a ton, with silver at 70 cents an ounce and lead at 8 cents a pound.

Down the hill a few hundred feet from this showing an open-cut 6 feet wide by 6 feet high at the face, which is a few feet underground, shows a flat vein of barite about a foot thick lying along the surface of the ground, and another about a foot wide standing almost perpendicularly in the face. There is no mineral showing anywhere in this cut. The flatly lying veins would naturally have the appearance of great width on the surface.

Altogether the possibilities of the property are very doubtful.

Argenta Mines, Ltd. This company was incorporated in March, 1925, with a capitalization of $1,000,000, divided into 1,000,000 shares of $1 each. Its registered office is in the Winch Building, Victoria. The properties of the company consist of the *Veteran* group, as follows: *Veteran*, *Veteran Nos. 1*, *2*, and *3*, and *Gringo Fraction*, owned by Erickson and Forrest; the *Comet* group, as follows: *Comet*, *Comet Nos. 1*, *2*, *3*, and *4*, owned by B. Erickson and associates; and nine adjoining and included claims and fractions staked by the company, as follows: *Comet No. 5*, *Comet No. 6*, *Comet Fraction*, *Veteran Fraction*, *Veteran No. 4*, *Veteran No. 5*, *Last Fraction*, *Lake Fraction*, and *Argenta No. 1*—nineteen claims in all. They were surveyed this year.

Both the *Veteran* and *Comet* groups were described in the 1920 Report of the Minister of Mines, since which time there has been further surface exploration, resulting in the tracing out of the three main veins—the *Veteran* or Erickson vein, the *Comet* vein, and the Blue vein—and the discovery of several more veins. There has been no underground work done yet and therefore no conclusions may be drawn. However, the surface showings and conditions are sufficient to suggest an important prospective merit to the property. As in the majority of properties in this district, shares will be speculative until actual underground work discloses substantial ore-bodies.

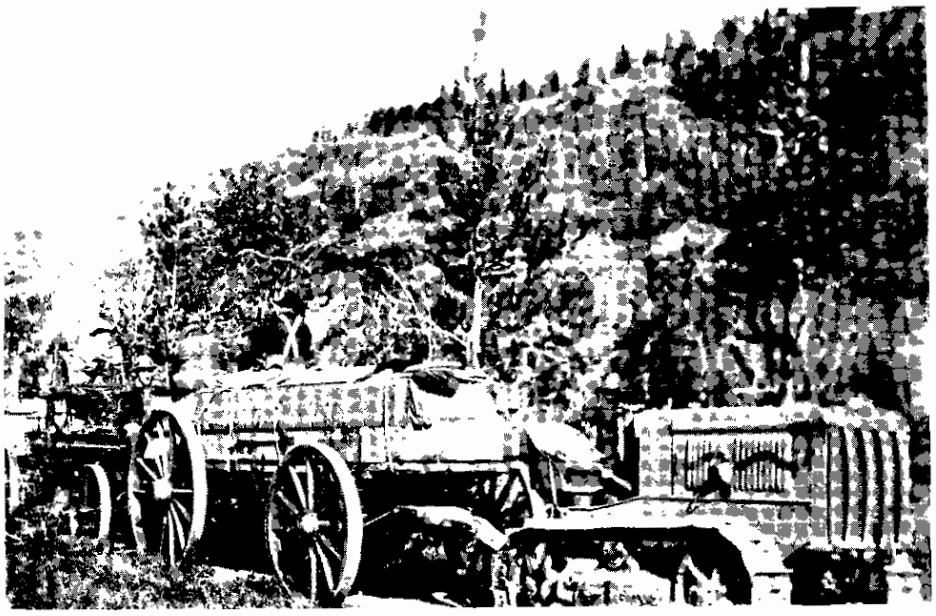
A. R. Morton has been on the ground for a month or more this summer and has obtained important data and platted a very useful map for deciding upon future exploration.

Rufus Silver-Lead Mines, Ltd. (*See* 1922 Report.) This company was incorporated in February, 1924, with a capitalization of $1,000,000, divided into 1,000,000 shares of $1 each, with its registered office in the Pemberton Building, Victoria. The company acquired from Ben Erickson, of Stewart, the *Rufus* group on the north side of Bear river, about 4 miles from the end of the wagon-road. The group contains the following claims: *Rufus*, *Rufus Nos. 1*, *2*, *3*, *4*, *5*, and *6*, and *Baby Rufus Fraction*, all surveyed for Crown-granting. In 1924 a trail was built from the main Bear–Nass trail to the upper camp and a considerable amount of surface prospecting, assaying, and geological work done under the supervision of Mr. Whitworth. A tunnel-site was decided upon from which to drive under the high-grade vein and other vein-croppings. This tunnel, estimated at 800 feet, was started late in the summer of 1925. The understanding is that no other work was done on the property during 1925.

Portland-Ibex Group. This group, owned by Sam Deschamps, of Stewart, consists of the following claims: *Portland Nos. 1*, *2*, and *3*, *Portland No. 4 Fraction*, *Portland Nos. 5* and *6*, *Ibex Nos. 1* and *2*, situated east of the mouth of American creek. This is the old Portland-Bear River Mining Company property, on which a tunnel was driven about 200 feet, following a small brecciated vein of quartz and slate carrying only low values. The old cabin is at 2,000 feet elevation and the tunnel at 2,400 feet elevation.



Premier Gold Mining Co., Portland Canal M.D.



Telegraph Creek Dease Lake Road, Stikine M.D.

There is little chance of finding anything of importance in the tunnel vein, but the ground is worth close prospecting.

Morning Group. There are six claims in this group—*Morning*, *Morning No. 2*, *Morning No. 3*, *Morning Fraction*, *Tiger*, and *Poorman*—owned by Sam Deschamps, of Stewart. The claims are on the east side of American creek, north of and adjoining the *Galena Farm*. The only importance of the group as yet is the probable extension of the *Galena Farm* vein through this ground.

Galena Farm Group. This group is owned by Sam Deschamps and W. Saunders, of Stewart, and consists of five claims—*Galena Farm*, *Galena Farm No. 1*, *Galena Farm No. 2 Fraction*, *Galena Farm No. 3*, and *Keystone*. At 250 feet elevation above the *Keystone* cabin a tunnel has been driven 40 feet, following a small vein of quartz in slate-rock formation. The vein strikes north-south and dips 50° E. Small amounts of galena are found which carry fair values, but not enough mineral to amount to anything. There are two other parallel veins south of the tunnel, striking N. 65° W., that have been opened up in a few places by open-cuts, showing the mineralization about the same. The veins are small and mineral scarce.

Morning Star Group. This group consists of *Morning Star Nos. 1*, *2*, *3*, *4*, and *5* mineral claims, owned by Sam Deschamps. They are situated at about 4,000 feet elevation and reached by the Portland-Ibex trail, which branches to the right from the main American Creek trail just beyond the *Keystone* cabin. There is a big area of quartzose rock in the greenstone formation, throughout which fine crystals of pyrite are disseminated. It has apparently been subjected to a crushing pressure, as it sloughs off in thousands of tons of small angular pieces. The oxidation of the iron has stained a considerable area a deep red, seen from the river below. A few shallow open-cuts have been put in showing no change. There might be some vein-matter and values along the contact of this mass and the country-rock, or within it where there has been a shearing or more intense silicification, but the general values are very low.

Vancouver Mines, Ltd. This company was incorporated in January, 1925, with a capitalization of $1,000,000, divided into 1,000,000 shares of $1 each, with its registered office in the Vancouver Block, Vancouver. The company, according to its prospectus, owns the *Hope* group, adjoining the Terminus property on the east side of American creek. The group was owned by Sam Deschamps, of Stewart, and consists of the following claims: *Hope No. 1 Fraction*, *Hope No. 2 Fraction*, *Hope No. 5*, *Hope No. 6 Fraction*, *Noonday Fraction*, *Noonday No. 2*, *Noonday No. 3*, *Noonday No. 4*, *Noonday No. 5*, *Noonday No. 6 Fraction*, *Noonday No. 7*, and *Dix*. They are accessible by the Terminus trail, which was this year improved into a good horse-trail with a grant from the Department of Mines.

On the *Hope No. 1 Fraction* at 3,700 feet elevation some work was done several years ago by D. D. Mann when he had an option on the holdings of the present Terminus Mines, Limited. Here a shallow tunnel was driven across a big iron-outcrop, cutting from 6 to 10 feet of practically solid pyrrhotite lying in greenstone country-rock. No values were found in the iron at this depth. The tunnel swings to the right and evidently enters the *Ayrshire* claim, one of the Terminus claims.

About 400 feet farther east, on the same level, another tunnel follows a slightly mineralized vein-dyke of quartz porphyry for 160 feet. No commercial values were found in this vein. Still farther east, on the *Hope No. 1 Fraction*, another parallel mineralized belt is readily followed along the surface by its heavily oxidized, red outcrops. These veins strike about S. 20° E. and apparently extend for some distance, as there is another showing consisting of siliceous greenstone, 6 feet wide, very heavily mineralized with pyrite and pyrrhotite, stained with copper, in which are bands 2 feet wide of solid iron. There are many vein-croppings over the side-hill above the Terminus ground, but they are all pyritized, altered greenstone, carrying low values. There are indications of copper in many of them, but it is questionable whether the copper content would improve at depth. No depth to amount to anything has been reached in any of the showings except the old tunnels mentioned above. The work done has been a shot here and there. Nothing was done by the company this year, though there is a fair camp on the property and a first-class pack-horse trail to it. The merits of the property are doubtful and of course will remain so as long as no work is done.

Terminus Mines, Ltd.

(*See* 1924 Report.) This company was incorporated in 1924 with a capitalization of $1,000,000, divided into 1,000,000 shares of $1 each. The registered office is in Victoria. The company acquired the Terminus group of claims, situated on American creek, from the original staker, H. Heywood. The claims are *Glenora*, *Edith M.*, *Ayrshire*, *Oneida*, *Evans*, and *Cobalt Fraction*, lying at a general elevation of 3,400 feet, about 20 miles from Stewart and 5 miles from the end of the Bear River wagon-road. This year the old trail was improved into a good horse-trail from the American Creek road-house to the camp.

The showing consists of a 2-foot dyke striking N. 40° W. (mag.) and dipping 65° E., on the hanging-wall side of which is a small vein of high-grade ore from 8 to 12 inches wide and on the foot-wall side one about 6 inches wide. On this a shaft was sunk 50 feet, from the bottom of which drifts were run 42 feet to the north and 34 feet to the south on the vein, which maintains its width and looks promising on this level.

It was therefore decided to drive a crosscut tunnel which would obtain about 100 feet depth on the veins. In 1924 270 feet of this tunnel was done. In 1925 the work was under the management of B. W. W. McDougall, M.E. The crosscut tunnel was extended to 370 feet. At a point 330 feet from the portal of the tunnel the foot-wall of the mineral-zone was cut and for several feet small stringers of ore were crossed by the tunnel. A drift was driven about 70 feet on the foot-wall of the vein without encountering any ore of importance. The dyke was also cut and drifted on for 20 feet south, there being very little ore on it at this level. A raise was put up on the dyke from this south drift to the intermediate level from the bottom of the shaft. The vein improved in width from the tunnel-level up. There would seem to be a considerable probability of picking up the ore-shoot by drifting farther south on the dyke on the tunnel-level, for the vein, as exposed in the intermediate drift, tends to widen going south. An encouraging amount of ore has been exposed for the work actually done on the vein.

The company intends to continue the crosscut tunnel another 150 feet to intersect a mineralized quartz vein outcropping on the surface higher up the hill. Altogether the work done has improved the prospective worth of the property.

A comfortable two-story house has been constructed for a camp and a good equipment for hand-mining provided.

Independence Gold Mining Co., Ltd.

(*See* 1923 and 1924 Reports.) This company was incorporated in 1924 with a capitalization of $1,500,000, divided into 1,500,000 shares of the par value of $1 each, with its registered office at Stewart. The properties of the company consist of the *Independence* group of six claims, situated on Goose creek, owned by Fitzgerald Bros., of Stewart, under whose supervision exploration-work has been done. Assistance was obtained in 1925 from the Department of Mines for the much-needed improvements to the trail, which is now in good condition for pack-horses. Work was closed down for a short time this fall, but has resumed for the winter. Extensive work has been done on the property during the last two years, which has been described in the Annual Reports.

By the first of 1925 good camps had been built, a compressor plant installed, and approximately 650 feet of underground work done. Work was continued in the No. 1 or main tunnel from the 400-foot point which it had reached at the end of 1924. A crosscut at this point shows a width of about 12 feet of low-grade ore, probably milling-ore if worked on a large scale.

The main drift was advanced in this ore to 600 feet, when native silver was noticed in very thin flakes along the fracture-seams in the ore. An effort was made to sort this class of ore out for shipment, but it was found that the necessary breaking into small pieces and very close sorting were too expensive for the results obtained. The native silver is so filmy that the general average value of the ore is not raised as much as might be expected.

At the time I examined the property (August 4th, 1925), the drift had been advanced about 40 feet since the native silver had appeared. I am informed that it is now in about 80 feet and that a crosscut has demonstrated the vein width here to be about 16 feet. The face at this point is over 400 feet below the surface. This ore is of possible milling grade, depending, as before stated, on the tonnage developed.

No profitable shipping-ore has as yet been encountered, but may be expected at any faulting or cross-fracturing in the vein or intersection by another vein. Such ore, if encountered, would probably be utilized as a sweetener for the predominating low-grade milling-ore.

To sum up, the results of work to the end of 1925 on this main vein are indicative of a tonnage of concentrating-ore. Surface indications are that there is another similar vein to the south of this which should be located from this main tunnel as soon as possible by crosscutting and explored, the objective being the exposure of an adequate tonnage to warrant a concentrating plant. The results of course are speculative, but I consider them less so than on properties having small high-grade showings.

Dalhousie Mining Co., Ltd.

This company was incorporated in the latter part of May, 1925, with a capitalization of $1,000,000, divided into 1,000,000 shares of the par value of $1 each, and with its registered office in the Permanent Loan Building, Victoria. The original holdings of the company consisted of the *Dalhousie* group, owned by George Cameron, of Stewart, and Al. Pratt, and situated on the west side of Bear river, opposite Bitter creek. The claims in this group are *Dalhousie, Talisman No. 1, Talisman No. 2, Talisman Fraction, Orient, Red Monster, Alpine,* and *Tillamook.* Subsequently the *Rock of Ages* group, owned by D. A. Munro, of Stewart, and situated north of and adjoining the *Dalhousie* group, was acquired. This group consists of the *Rock of Ages Nos. 1, 2, 3, 4, 5, 6, 7,* and *Rock of Ages Fraction.* The *Dalhousie* group was reported on in the 1920 Minister of Mines' Report. I have not examined the *Rock of Ages* group.

Considering the situation of the property, which assures economical mining and cheap transportation, and from the surface ore indications on the *Dalhousie* group, I consider the showings have considerable prospective merit and are worthy of exploration.

The only work done this year by the company was the construction of a trail for part of the way, starting just below the railway-bridge at the little canyon on Bear river. This work was ably laid out and superintended by George Cameron.

Gold Cliff Group.

This group, consisting of the *Gold Cliff, Gold Cliff No. 1 Fraction, Gold Cliff No. 2 Fraction, Gold Cliff Nos. 1, 2,* and *4, Jerry Dog, Tom,* and *Barney,* is situated about 3 miles from Stewart, on the west side of Bear river, adjoining the *Bayview,* and is owned by W. Dann, N. Dann, and Jim Douville, of Stewart. Adjoining this group is the *Cliff* group, owned by the same people, and consisting of *Gold Cliff No. 5, Gold Cliff No. 3 Fraction, Margaret, Gold Cliff No. 6, First Fraction, Zeal, Jim,* and *Gold Cliff No. 2 Fraction.* These claims were all bonded to A. B. Trites in October, 1924, who repaired the trail, rushed up a winter camp, and got in supplies before the heavy snows came. A contract was let for tunnel-work.

In the spring of 1925 a tent camp was established on the *Bayview* trail at 2,750 feet elevation. Trails were built from the camp to the two tunnels where work was being done and the main trail put in better condition with assistance from the Department of Mines.

Two veins were opened up both by surface and underground work. The upper tunnel, at 3,050 feet elevation, is a crosscut for 50 feet from the portal, where the vein was encountered. The vein was then drifted on for over 50 feet, showing the ore to be of erratic width, pinching and widening, but not as promising as on the surface, where it had been exposed by open-cutting for several hundred feet, showing in places 20 inches in width of shipping-ore assaying as high as 250 oz. in silver to the ton. A few pieces of galena from the face assayed: Gold, $10.80 to the ton; silver, 112 oz. to the ton; lead, 38 per cent.; zinc, 16 per cent.—a good shipping-grade ore.

The lower vein is also being opened up. It has been stripped along the surface for 100 feet or more, showing the vein to be about 4 feet wide, very heavily mineralized, mainly with galena. It has also been exposed farther up the hill in places, showing it to be striking toward the upper vein at a small angle. A crosscut tunnel is being driven to cut the vein under the surface exposure of good ore. It is now in 25 feet and will encounter the vein in an additional 10 or 15 feet. My examination was made on July 20th, 1925, and I was favourably impressed with the surface showings and the possibilities underground. However, about the first of August A. B. Trites relinquished his option on the property, which reverted to the owner.

I am informed that the claims, whether all of them or not I do not know, have been acquired by the Bayview Mining Company, whose properties adjoin these claims on the west.

Bayview Mining Co., Ltd.

(*See* 1922 Report.) This company was incorporated in March, 1925, with a capitalization of $250,000, divided into 1,000,000 shares of the par value of 25 cents each, with registered office in the Rogers Building, Vancouver. The company has acquired fourteen claims on Mount Dolly, about 2 miles north

of Stewart, on the west side of Bear River. These claims are *Bayview Nos. 1* and *2*, *Tacoma*, *Kent*, *K.P. No. 1*, *Lucille No. 1*, *Beth*, *First Fraction*, *Mary*, *Zeal*, *Jim*, *Nettie*, and two others adjoining the *Bayview Nos. 1* and *2* on the south-east.

Considerable work had been done on two veins outcropping on the *Bayview No. 1* and *Bayview No. 2*. The ore lies along the contact of the granodiorite with metamorphosed rocks to the west of it. The other vein lies above the first within the altered belt, about 700 feet from the contact. Open-cuts along this vein show short lenses of galena, with which are associated grey copper and silver sulphides, giving very high silver values in places. No depth has been obtained on this vein, which I consider very promising from surface indications.

In 1925, in the latter part of June, a tent camp was established at the head of the trail, on the edge of timber, about 3,500 feet elevation. Bill Irwin was put in charge of the work with a crew of six to ten men and succeeded in making a very creditable showing. A new vein was discovered on the *Lucille No. 1* claim, which a number of open-cuts and stripping traced several hundred feet up the mountain and showing its strike to be about N. 60° W. (mag.) and dip about 45° N.

It therefore lies at about right angles with the granite-contact. At the time of my examination the latter part of July about 100 sacks of ore had been sorted from the work done. Altogether about 10 tons was shipped, assaying: Gold, $1.40 to the ton; silver, 171 oz. to the ton; lead, 16.5 per cent.; zinc, 21.5 per cent., through the European Smelter Agency.

This vein is up to 2 feet in width, showing in places 8 inches of clean sulphides, galena, zinc-blende, and pyrite, carrying grey copper which gives the high silver values. The quartz portion of the vein is fairly well mineralized and when concentrated will probably give higher values than the solid sulphides.

I understand that some work was done later in the season on the upper vein, with satisfactory results. The intersections of this cross-vein with both the upper vein and the contact-vein lying on the granodiorite should prove interesting points for development-work.

The season's work has increased the probable merits of the property very much, but, like others, it must be considered speculative until ore is actually developed in quantity underground.

The company has strengthened its properties by acquiring the *Gold Cliff* group (*which see*), adjoining it on the south, from Douville and Dann.

SALMON RIVER SECTION.*

This section, having an area of about 60 square miles, is the Salmon River valley above the Alaska-British Columbia boundary, which crosses at 13 miles from the mouth. It is accessible by auto-road from Stewart to the Premier and B.C. Silver Mines, from which road trails branch to the upper valley and the different properties.

It was stated in the "Summary of Mining Operations to August 31st, 1925, British Columbia," that there were four properties under exploration, the results of which would decide the mining future of this section for some time. Of the four properties, *Forty Nine*, *Big Missouri*, Bush Mines, and B.C. Silver, the *Forty Nine* has proved a disappointment, the *Big Missouri* so far is developing very promisingly, the Bush Mines has taken on prospective importance from the developments of the B.C. Silver, and the B.C. Silver has, with very little possibility of doubt, been brought in as a mine. The last three of these, in conjunction with the increased capacity of the Premier plant, certainly stabilizes mining in this section. The final success of the B.C. Silver again exemplifies the necessity of extensive exploration and will be an incentive for the persistent prospecting of other properties.

The Premier Gold Mining Company paid $1,600,375 in dividends in 1925, making a total of $8,250,000.

Alaska Canadian Consolidated Gold Mines, Ltd. This company was incorporated in December, 1924, with a capitalization of $3,000,000, divided into 3,000,000 shares of the par value of $1 each, with registered office in the Yorkshire Building, Vancouver. So far as I can learn, the holdings of the company consist of the *Kitchener*, *Woodbine*, and *Woodbine Fraction* Crown-granted claims, situated on the west side of Cascade creek, a short distance above the Cascade bridge, acquired from Lake and O'Leary; and the *Bank* group of eight claims in the Salmon River valley, acquired from H. D. Cameron and associates. The three claims, *Kitchener*, *Woodbine*, and *Woodbine Fraction*, were formerly under option to

* Geology and Ore Deposits of Salmon River District, British Columbia, Memoir 132, by Geo. Hanson and S. J. Schofield.

and included in the holdings of the Premier Extension Gold Mining Company, Limited. (*See* 1923 Annual Report.)

Some work was done in 1925 on the *Woodbine* claims, with Malcolm MacKenzie in charge. At 1,300 feet elevation on the *Woodbine* an open-cut of 20 feet continued as a tunnel for 15 feet cuts across a silicified greenstone-belt fairly well mineralized with pyrite, with a small percentage of galena and zinc. The whole 35 feet is more or less pyritized, but there is a portion of 15 feet in width in the centre which appears to be more siliceous and better mineralized, especially in the bottom of the cut, which is about 8 feet deep at this point. Values of $15 to the ton in gold and silver are claimed across the 15 feet. This vein strikes north-south (mag.) and dips 50° W. between well-defined walls. A substantial depth could be obtained on this showing by a short crosscut from the foot of the bluff. This width of the values stated is worth considerable exploration.

On the *Woodbine Fraction*, at 1,000 feet elevation, a vein has been exposed in the big bluff just above the old trail and traced down the hill across the new wagon-road 100 feet or more. A cut across the road and in the bluff above the road shows some very favourable-looking ore across 20 feet, consisting of siliceous greenstone mineralized with pyrite, chalcopyrite, galena, and zinc. A short tunnel on the upper side of the road shows about 4 feet on one side of it of good-looking ore, said to carry high values in gold, silver, and copper. This vein also strikes north-south (mag.) and dips from 50° to 60° W., therefore paralleling the first-mentioned vein. The vein was being faced up for a tunnel high enough above the road for an overhead trackway.

These are promising showings and I intended sampling them on my return trip from the upper valley, but came back on the opposite side of Cascade creek. They are ideally located, the new wagon-road crossing them about a mile from the main Premier road.

Premier Extension Mining Co., Ltd.

This company is a registered (1923) extra-provincial company, incorporated at Ottawa, Ontario, with an authorized capital of $4,000,000, fully paid up, with its head office in the Winch Building, Vancouver. The company acquired from H. McGuire the *Vancouver* group of ten claims and the *Woodbine* and *Kitchener* claims from Lake and O'Leary. I do not know the present status of the company. The claims of the *Vancouver* group were all Crown-granted. The veins now exposed on the *Woodbine* and *Woodbine Fraction* undoubtedly extend into the ground covered by the *Vancouver* group.

Glacier Group.

There are seven claims and a fraction in this group—*Glacier Nos. 1, 2, 3, 4, 5, 6,* and 7 and *Glacier Fraction*—owned by Jancowski and Scoville, of Stewart. The group is situated on the east bank of the Salmon glacier below the *Indian* ground and is reached by a fair foot-trail branching from the *Indian* trail and skirting the north side of Indian lake. The country-rock is greenstone or the Bear River formation.

The showing is a quartz vein from 3 to 5 feet wide, striking at right angles to the glacier at S. 80° E. and dipping at about 45° S. The quartz is mineralized with pyrite and some chalcopyrite and samples assaying high in gold have been obtained.

The work done so far has been in tracing the vein up the hill by open-cuts at intervals. The highest cut opened this year, at 1,200 feet elevation, shows about 4 feet of sparsely pyritized quartz showing traces of galena. A good cabin has been built at 1,350 feet elevation for the accommodation of four or five men.

The little divide above Indian lake is 1,600 feet elevation, where a road would be located going to the east side of the glacier to serve properties across the glacier.

Indian Mines Corporation, Ltd.

(*See* 1922, 1923, and 1924 Annual Reports.) This corporation is a reorganization of the Indian Mines, Limited, whose original capitalization was $1,000,000, divided into 1,000,000 shares of the par value of $1 each, which was in 1922 increased to $1,600,000. In July, 1923, the present corporation was incorporated with a capitalization of $3,000,000, divided into 3,000,000 shares, with its registered office in Prince Rupert.

Up to the end of 1924 about 5,700 feet of underground work had been done and some 7,000 feet of diamond-drilling, with the net result that no ore of any account was found other than drifted on in the upper or No. 1 tunnel. The No. 3 tunnel, about 200 feet vertically lower than No. 1, has been driven 1,400 feet, from which over 500 feet of crosscutting and several thousand feet of diamond-drilling has been done without locating any ore of importance.

During 1925 about 2,000 feet of diamond-drilling was done from the No. 3 tunnel, with disappointing results. A cross-drift was driven about 250 feet, following a soft material lying between two dykes, which did not prove much of anything.

The company shipped 37 tons of ore to Belgium this year, assaying 0.12 oz. in gold to the ton, 13 oz. in silver to the ton, 33 per cent. lead, and 18 per cent. zinc.

Mineral Basin Group.

This group comprises the following claims: *Mineral Basin*, *Mineral Basin No. 1*, *Mineral Basin No. 2*, *Mineral Basin Fraction*, and *Golden Fraction*. They are situated south-east of and adjoining the claims of the Indian Mines Corporation and are owned by William McGrew and associates. The claims were surveyed and Crown-granted during 1925.

Chief Metals Co.

This is a Seattle company with an authorized capital of $125,000 that was registered in the Province of British Columbia in February, 1924, with its registered office in Stewart. The property consists of the *Start* group—*Start Nos. 1, 2, 3,* and *4*—situated on the west slope of the north end of Slate mountain, acquired from Dan Anderson, an old-timer in the Stewart country, who died in Seattle last winter. I have not been on the property, but am informed by Emil Davis, who was in charge of the work this year, that a tunnel is being driven on a promising vein showing galena. The stock of the company is held mainly in Seattle.

Big Missouri Mining Co., Ltd.

This is a Seattle company with an authorized capital of $5,000,000, fully paid, registered in December, 1925, as an extra-provincial company, with its office at 626 Pender Street West, Vancouver. It is a subsidiary of the Standard Mining Corporation, a Tacoma company registered in September, 1925, with an authorized capital of $250,000, fully paid. This corporation in July bonded the *Big Missouri* group, consisting of sixteen claims and four fractions, all Crown-granted, owned by Dan Lindeborg, and situated east of the Salmon glacier along the ridge for 2 miles. Work was started in August, 1925, under the supervision of Pat Daly, who had been instrumental in interesting the corporation in the property.

The old camp was reconditioned and a crew of fifteen to twenty men put on. A complete assaying and metallurgical testing plant was installed, with P. E. Peterson in charge. Later a compressor plant was added. Until the snow came the work was mainly surface prospecting, open-cutting, sampling, etc., with apparently such satisfactory results that the Big Missouri Mining Company was formed to carry on the development. In September the property was examined by the company's consulting engineer, Harry Townsend, and other engineers.

Surface exploration showed good gold values on the *Golden Crown*, on which some work had been done years ago. Altogether 135 feet of work was done on this claim in 1925. Another showing along the bed of the creek had about 60 feet of work done on it in open-cutting and crosscutting. Underground work was started in the old Mann tunnel as soon as the compressor was in commission and about 85 feet of crosscutting was done here by the end of 1925. This work will be continued all winter.

Altogether the results so far have been of a very encouraging nature and it is expected that by spring the evidence will be sufficiently conclusive to warrant considerable expansion in equipment and general operations.

The *Big Missouri* has been under option five or six times and has therefore had a considerable amount of work and a great deal of theorizing done on it, the great (and common) idea being of course to expose enough high-grade ore in a season to make it a mine. It looks as if the present operators were going at the undertaking along more practical and broader lines, the objective being to develop an adequate tonnage of profitable milling-ore and know that it can be milled. No high grade, of course, will be barred.

Mineral Hill Mines, Ltd.

This company was incorporated in January, 1920, with a capitalization of $2,500,000, divided into 2,500,000 shares of $1 each. Its registered office is in Vancouver. The company acquired the *Mineral Hill* group of seven claims, adjoining the *E. Pluribus* and *Golden Crown* of the *Big Missouri* group on the east, and composed of *Little Joker, Lookout, Mystery Fraction, Pass Fraction, Mineral Hill, Midas*, and *Midas Lake Fraction*. In view of the prospective importance of the *Big Missouri* this property may take a new lease on life. The surface showings are the extension of those on the *E. Pluribus* and will therefore be directly benefited by any development on that portion of the *Big Missouri*.

Unicorn Group. This group is owned by John Hovland and Louis Watkins, of Hyder, Alaska, and consists of the *Good Hope*, *Unicorn*, *Unicorn No. 2*, *Unicorn No. 3*, *Silver Creek Fraction*, *Snow King*, *H. & W. Fraction*, and *Unity*, which were Crown-granted this year, and *Unity Fraction* and *V. Fraction*, not yet Crown-granted. They are situated north-east of and adjoining some of the *Big Missouri* claims, the three upper claims lying west of and adjoining the *Silver Tip* group. Most of them were staked in 1918. The general rock formations and geological features are similar to the *E. Pluribus* and *Laura* claims of the *Big Missouri* group.

The work consists of many open-cuts which have exposed both the north-south veins and the cross-veins striking nearly east-west. Samples from these cuts give values in gold and silver up to $40 to the ton. Fair values found in so many places would seem to give some probable merit to the property and be worth some systematic exploration.

Silver Tip Mining Co., Ltd. This company was incorporated in May, 1925, with a capitalization of $1,000,000, divided into 1,000,000 shares of the par value of $1 each, with its registered office at 323 Sayward Building, Victoria. The company acquired the *Silver Tip* group of five Crown-granted claims—*Bella Coola*, *Good Hope*, *May P.J.*, *Silver Leaf*, and *Lady Bird No. 2*—situated on Silver creek, in the upper Salmon valley. All the Salmon River valley rock formations are represented on these claims—the overlying Nass River slates; then the Salmon River formation of conglomerates; then the underlying Bear River formation of tuffs, etc.; while across the north-eastern portion of the property the belt of dykes cuts through in a general north-westerly direction. The geology is fully discussed in the company's prospectus.

The important showing so far is a quartz vein outcropping on the north side of Porphyry creek, a small tributary of Silver creek, at an elevation of 3,600 feet. Two open-cuts about 50 feet apart have been driven across the vein, showing it to be from 2½ to 4½ feet wide, of quartz well mineralized with galena and zinc-blende, carrying silver sulphides. The vein strikes about east-west (mag.) and dips flatly at about 35° S. The foot-wall is a wide porphyry dyke and the hanging-wall is argillite at the east cut and conglomerate at the west cut.

The east cut shows, as stated, about 2½ feet of fine-looking ore, of which about a foot on the foot-wall is very heavy galena, and no doubt high-grade ore, as the galena will assay well over $100 to the ton.

The west cut, down at the edge of the creek, shows a vein-width of 4½ feet, which, according to Jack Clegg, who is supervising the work, will average $85 to the ton in silver and lead values. Above this opening about 15 feet on the apex of the vein another cut exposes about the same width of vein, but not so heavily mineralized. Shipping-ore could be sorted from this surface ore, but the whole would make a fine grade of milling-ore, having a ratio of concentration of probably 6 into 1, yielding a high-grade concentrate.

There is only about 15 feet of the vein exposed above the creek-bed, and it was therefore decided, in order to obtain depth on the vein, to drive a crosscut tunnel from an advantageous point below on the bank of Silver creek. This will necessitate a drivage of approximately 200 feet to obtain 9 feet depth on the dip of the vein. The possibilities of this showing are very favourable, but of course the crosscut tunnel will tell the story.

On the upper portion of the *Bella Coola* a number of cuts have been put in on the porphyry dykes, showing small veins in the dyke. These, where mineralized, are high-grade ore, but they are too small and erratic to give much encouragement. Just west of the camp and on the east bank of Williams creek a quartz vein about 2 feet wide has been exposed with a few shots. It lies on the foot-wall of one of the porphyry dykes and is fairly well mineralized with light-coloured zinc-blende, but the values are very low. It is, however, worth while doing a little work here to make sure that nothing is being overlooked.

Some very rich float was found along the trail to the *Forty Nine*, about on the *Lady Bird No. 2-Silver Leaf* line. The float assayed 394 oz. in silver to the ton and its size indicates a substantial width of vein. Prospecting in this vicinity will likely locate it in place.

Farther north on the south end of the *Bella Coola* a new vein, striking east-west, was found since my examination. It is reported as 5 feet wide, of which 30 inches is good ore, the balance being of probable milling grade. A depth of approximately 100 feet could be obtained on this, with about the same footage of tunnel.

Though these ore-outcroppings have not been proven at any depth as yet, the substantial widths of the veins and values certainly give a considerable prospective merit to the property.

Should the *Big Missouri* fulfil present expectations, the completion of the wagon-road to that property will be necessary, which will assure the *Silver Tip* of transportation. Altogether it has a favourable outlook.

Silver Crest Mines, Ltd.

(*See* 1924 Annual Report.) This company was incorporated in October, 1919, with a capitalization of $500,000, divided into 2,000,000 shares of 25 cents each. The properties consist of the *Silver Hill* group of eleven Crown-granted claims, situated on the south-east slope of Mount Dilworth, at the head of the Salmon River valley, and adjoining the *Silver Tip* on the north. Briefly, the country-rock is mainly slates, overlying volcanic tuffs and quartz porphyries, the whole intruded by a number of dykes of all ages and types, termed by Hanson the "Belt of dykes." Some of them are mineralized and some are not.

The mineral-showings on this property are mainly in the dykes. Numerous ore-exposures have been made by a systematic open-cutting of the surface. The main showing is a porphyry dyke striking N. 20° W. (mag.), in which there are a number of small veins of mineral and mineralized quartz running with the dyke. There are four open-cuts along this dyke, exposing, in places, a width of 3 to 4 feet, in which are several stringers of high-grade silver ore. The cuts show the mineralization at intervals for a length of over 200 feet.

The No. 2 tunnel was being driven to obtain a depth of about 80 feet under the highest ore-exposure. At the time of my examination, August 20th, 1925, eight men were employed under the efficient superintendence of Seymour Campbell, comfortably housed in a two-story frame building near the mouth of the tunnel and at 3,950 feet elevation.

At that time the tunnel had been driven 120 feet without encountering any ore of importance. This has since been continued to 250 feet, with better results reported. Forty tons of ore sorted from the surface cuts was ~~shipped this~~ fall, assaying 246 oz. to the ton in silver.

Montana Group.

This group is situated north of and adjoining the *Big Missouri* and is owned by J. A. McDonald, Ed. Fernald, and Geo. Fraser, of Stewart. The three claims, *Montana No. 1*, *Montana No. 2*, and *Tip Top Fraction*, were surveyed and Crown-granted in 1925. I have never examined the property, but am informed that there are some likely-looking showings.

Hercules Mines, Limited.—(*See* 1920–23 Minister of Mines' Reports.)

Forty Nine Mining Co., Ltd.

(*See* 1919–20 Minister of Mines' Reports.) This company was organized in April, 1919, with a capitalization of $1,500,000, divided into 1,500,000 shares of $1 each, with its registered office in the Rogers Building, Vancouver. No work has been done on the property since 1920 until this year (1925), when the Premier Gold Mining Company did some intensive exploration. A compressor plant was taken over the top of the mountain, over 4,000 feet elevation, from the *Big Missouri* early in the spring before the snow left and installed at an advantageous point. Air-lines were run in all directions from it to machines working on the different surface showings. In addition to this, three gas-driven diamond-drills, each working two shifts, were operated—one on the *Forty Nine*, one on the *Chicago*, and one on the *Occidental* showings. The results were obviously unsatisfactory as all the equipment was removed from the property this fall (1925), the compressor plant going to the *Big Missouri*.

Northland Mining Co., Ltd.

This company was incorporated in January, 1925, with a capitalization of $1,500,000, divided into 1,500,000 shares of $1 each, with its registered office in the Dominion Bank Building, Vancouver. The company acquired from Neil McDonald, of Stewart, the original staker and owner, the *Troy* group of nine claims, as follows: *Troy*, *Troy No. 2*, *Troy No. 3*, *Butte*, *Welcome*, *L.X.*, *Reward*, *Terry*, and *Deadwood*. In addition, the *Beech* was staked this season by the company, making ten in all. They are situated on the east side of the head of Salmon glacier, extending from the glacier up the hill to an elevation of about 3,900 feet. They are about 26 miles from tide-water. Horses may be taken through to the property, but the upper portion of the trail, from the *Forty Nine* over the divide, which is at 4,300 feet elevation, is not in good condition in places.

The general country-rock of this vicinity is the Bear River formation, or locally termed greenstone. On the claims there is a wide belt of argillite, striking S. 75° E. into the hill, the erosion of which has formed a deep canyon extending from the Salmon glacier to the glacier on the top of the mountain. Lying on the north of the argillite is a large area of light-coloured

porphyritic rock, beyond which is greenstone. Numerous dykes cut diagonally across the argillite. Along these dykes there is, as a rule, some mineralization, but so far nothing of importance has been found. It remains to be demonstrated what influence they will have at their intersections with the main east-west veins.

The showings of any importance as yet are two quartz veins, one on each side of the argillite-belt, though I noted that the north vein lies wholly in the porphyry on the upper claim. The strike of the veins is therefore with the argillite, S. 75° E. (mag.), and the dip about 65° N. The work to date has been under the superintendence of Neil McDonald, who had a crew of from six to eight men on the ground this season. Detailed surveys were made and platted by Jack Shannon, a British Columbia University student. Operations consisted of the establishment of a summer camp convenient to the work contemplated, and later the construction of a permanent camp at 3,000 feet elevation, at the foot of the mountain near Daisy lake. It is a double cabin, each part 14 by 16 feet, with a 10-foot shed and store-room between, and is unique in having a cement floor. In the meantime much surface prospecting was done and a number of open-cuts put in on the two main veins, exposing them at intervals from the lower end of the canyon at 3,000 feet elevation to the upper claim at 3,800 feet elevation.

The south or No. 1 vein is open-cut at the lower end, here showing a dyke between 3 and 4 feet wide, on each side of which is about a foot of mineralization, in which occur small veinlets of high-grade silver ore. This vein lies along the base of the north wall of the canyon, and as an excavation had to be made in the snow to get at it very little surface was exposed on either end of the cut. Some further work along the vein should be done here.

At 3,485 feet elevation, at the edge of the snow in the botttom of the canyon, a crosscut tunnel has been driven in argillite 25 feet to the north, toward cutting the north vein under an open-cut on the surface, 120 feet above, exposing some high-grade ore. I have no information as to whether this was advanced to the objective or not. This is the only underground work on the property. Farther up the canyon, at 3,600 feet elevation, another open-cut was driven across and along the south vein, here lying in the north wall of the canyon. The vein has been stripped at both ends of the cut, exposing an ore-shoot about 30 feet in length, which dies out at either end into small stringers of barren quartz extending along the strike of the vein. The open-cut demonstrates the width of the vein to be about 5 feet at this point, of which 2 feet of quartz is fairly well mineralized with stringers and narrow bands of zinc-blende and galena showing some grey copper. These stringers of ore put together would total about 6 inches of the vein-width; the balance of the vein would be low grade. About 8 sacks of ore was sorted at this cut and shipped out in the fall of 1925, but no assay or smelter returns have as yet been announced. This is the highest work on the south vein and is the best showing yet exposed.

On the north or No. 2 vein, approximately 80 feet north of the south vein, the lowest open-cut is at 3,600 feet elevation, on the top of the north wall of the canyon and directly over the crosscut tunnel mentioned. This cut has disclosed some stringers of high-grade ore. The vein here is about 10 feet in width, of which a portion about 4 feet wide is mineralized with stringers of zinc-blende and galena with some grey copper; the balance of the vein is argillite and soft black gouge. The face of the cut is about 6 feet high. The upper part of the 4-foot section is sparsely mineralized, but there is about 2 feet of good-looking ore in the bottom of the face. High-grade, selected samples have been obtained from this cut, but an average of the mineralized portion would be only a medium-grade ore. Going east, up the hill, about twelve more cuts have been put in at intervals along the vein, proving its continuity for over 1,000 feet, but none of the cuts show ore to amount to anything.

North of the summer camp there is another vein outcropping in the bed of a small creek. There is some mineralization of zinc-blende and galena, and, though small, might be worth some prospecting.

It is obvious that the season's work has not materially improved the prospective merit of the property, and there is therefore nothing to warrant the advancement of the price of the stock as announced on page 4 of the *Troy Mining News* (October-November-December issue). The *Troy* mines have not developed a pound of ore underground and, so far, very little on the surface, and therefore the price of the first issue of stock, 25 cents a share, was sufficiently speculative.

The "sinking fund" as outlined on page 2 of the above-mentioned magazine, of $1 a ton of the ore from *Troy* mines for the redemption of bonds, will continue to sink if it is depending on the present tonnage.

The failure of the *Forty Nine*, south of the *Troy*, to respond to intensive exploration-work this season, the location of the *Troy* and lack of transportation, and the questionable methods of stock-selling are factors which detract from the prospects of the *Troy* group.

Salmon River High Grades, Ltd.

This company was incorporated in May, 1925, with a capitalization of $500,000, divided into 500,000 shares, with its registered office in Victoria. It acquired the *Daisy* group of seven claims from Pat Benson and associates. The claims are *Daisy*, *Daisy Nos. 1* and *2*, *Summit*, *Summit Nos. 1*, *2*, and *3*, situated on the east side of the head of Salmon River glacier, about 27 miles from tide-water. A cabin was built this summer on Daisy lake at 2,950 feet elevation.

The country-rock in the vicinity of the showings near the edge of the lake is a schistose rock, which has been intensely compressed and folded and distorted into all shapes. Several open-cuts have been put in on two small quartz veins, in which is an occasional patch of grey copper, from which the high assays reported have been taken. The veins can be traced some distance following the contortions of the rock formation, but there is nothing on the surface giving any promise for the development of ore. Any exploration-work at depth would necessitate sinking.

Considering the location of the property, transportation, and the surface showings, I could not recommend further work here.

I did not have time to examine any of the four properties being worked on the west side of the Salmon glacier. They are briefly described as follows:—

Munro Group.

This group consists of eight claims, owned by Messrs. Munro, McDonald, and McBride, of Stewart. It is stated that there are several promising small quartz veins heavily mineralized with galena and grey copper, carrying high silver values.

The Outland-Silver Bar Group.

This group is owned by Messrs. Outland and Bartholf, of Seattle, and was staked in 1921 by E. H. Bartholf, an old-time prospector. There are seven claims in the group, situated on the point south of the West arm of Salmon glacier and in the "belt of dykes." There are a number of showings of galena and grey copper, carrying high-grade silver values. A small shipment of 2½ tons was taken out in 1925, assaying $164 to the ton.

Eldorado Gold Mines, Consolidated, Ltd.

(*See* 1923 Report, Eldorado Gold Mining Company, Limited.) This company was incorporated in April, 1924, with a capitalization of $1,500,000, divided into 1,500,000 shares, with its registered office in Victoria. This is a reorganization of the Eldorado Gold Mining Company, Limited, an extra-provincial company registered in British Columbia in October, 1923. I have not been on the property since 1923, to the report in which year the reader is referred. T. V. Wilson, under whose management the work is being done, was on the property in the summer of 1925 for some time, but I have no information as to what was done.

Hollywood Mines, Ltd.

(Formerly Cronholm-Barthelf Mines, Limited.) The Cronholm-Barthelf Mines, Limited, was incorporated in 1922 and the name was this year changed to the Hollywood Mines, Limited, with the same capitalization of $250,000, divided into 250,000 shares. The *Hollywood* group—*Hollywood Nos. 1*, *2*, *3*, *4*, *5*, *6*, *7*, *8*, *9*, *10*, and *11*, comprising the company's properties—was Crown-granted this year. They are situated on the north side of the West arm of Salmon glacier. Work under the supervision of Mr. Cronholm is carried on during the summer months.

B.C. Bonanza Mines, Ltd.

(*See* 1920 Minister of Mines' Report, *Spider* group.) This company was incorporated in May, 1925, with a capitalization of $750,000, divided into 3,000,000 shares of 25 cents each, with its registered office in the Orpheum Building, Vancouver. The company's properties consist of two groups—*Spider* and *Web*—situated on the east slope north-east of Long lake. The *Spider* group has three claims—*Spider No. 1*, *Spider No. 2*, and *Spider No. 3*—staked in 1918 and owned by Bill Hamilton and Charlie Larsen, of Stewart. The *Web* group—*Web*, *Web Nos. 1*, *2*, *3*, *4*, and *5*—staked in 1924 and owned by Messrs. McLeod, Tooth, Howse, and McBride, of Stewart, adjoins the *Spider* on the east.

The property is accessible by trail from the *Big Missouri* camp over the low ridge between the Harris Creek basin and Long Lake basin. There is also a trail from the Bush Mines camp up the East fork of Cascade creek, skirting the west side of Long lake.

The country-rock of this group is augite porphyry, which has intruded the overlying Nass River slates and the Salmon River formation of tuffs and conglomerates.

The surface showings indicate four or five quartz veins, of which the north vein is the largest and, so far as known, carries low values. Subsequent to the filling of the north vein, shearing action formed several roughly parallel, small, high-grade quartz veins, converging at a small angle toward the big quartz vein. One of these veins has been shown to cut the big vein.

The old work consisted of surface work on No. 3 vein, the second vein south of the main vein, where a small shoot of high-grade ore was opened. In order to obtain depth a tunnel was started on the next vein north and driven about 700 feet, encountering small lenses of high-grade ore. A crosscut was run from the long tunnel to presumably the high-grade vein exposed in the surface, but was disappointing in that it did not reach high-grade ore of any importance.

The work of 1925 consisted of reconditioning the old camp, which had not been used since 1920. The compressor-engine was found to be beyond repair and development was continued by hand-work. This was mainly surface exploration, open-drifting along No. 3 vein, and sorting and sacking ore. Two tons was sorted and sacked from the dump of the old tunnel, assaying 0.46 oz. in gold to the ton, 384.3 oz. in silver to the ton, 9 per cent. lead, and 13 per cent. zinc. Also 5 tons was sorted from the open-cut on No. 3 vein, assaying 0.44 oz. in gold to the ton, 365.5 oz. in silver to the ton, 8.4 per cent. lead, and 13.6 per cent. zinc. Good-grade ore was found on two new veins opened up.

The management intends taking in over the snow a 50-horse-power engine for the compressor. When the power plant is in commission a crosscut tunnel will be started from the end of the old tunnel to cut Nos. 3, 5, and 6 veins at an approximate depth of 150 feet on the dip of the veins. A 500-foot crosscut is estimated for this objective. The evidence so far gives the property some prospective merit warranting the proposed work.

White Heather Mines, Ltd. This company was incorporated in September, 1924, having a capitalization of $50,000, divided into 50,000 shares, with its registered office in Victoria, and acquired the *White Heather* group, staked and owned by F. C. and E. R. Winkler and associates. The claims, staked in 1923, are *White Heather Nos. 0, 1, 2, 3,* and *4* and *White Heather Fraction* and are situated east of the south end of Long lake. I have not examined the property, but understand that some exploration by diamond-drilling has been done, the results of which I have no information.

National Silver Mines, Ltd. This company was incorporated in March, 1920, and capitalized at $1,500,000, divided into 1,500,000 shares. The company in the spring of 1925 took on the development of the Bush Mines, Limited, property adjoining the B.C. Silver on the north, with O. B. Bush in charge of operations. A wagon-road was built across from the B.C. Silver road to the Bush camp, the old camp reconditioned, and diamond-drilling commenced early in the summer. No information is available as to the results of the drilling other than Mr. Bush's statement that they were satisfactory.

The more recent findings of the B.C. Silver have, however, given the Bush Mines a very substantial prospective value, resulting in the Sebakwe and District Mines, of London, England, acquiring the control of the Bush property. The Selukwe Gold Mining and Finance Company, controlling the B.C. Silver Company, is now reported to have acquired control of the Sebakwe and District Mines.

It will mean the extensive development of both properties and the "bringing-in" of another mine in this district.

B.C. Silver Mines, Limited. (*See* 1922, 1923, and 1924 Reports.) This company was incorporated in October, 1919, with a capitalization of $1,500,000, divided into 1,500,000 shares, with its head office in the Pacific Building, Vancouver. The properties of the company comprise two groups, one north and the other south of and adjoining the mining property of the Premier Gold Mining Company, Limited. The north group is the only one that has been developed as yet and it contains the north-easterly extension of the Premier ore-zone.

Briefly, the work done to the first of 1925, since starting in July of 1922, consisted of driving two tunnels of 270 feet difference in elevation, from which hundreds of feet of crosscutting and about 18,000 feet of diamond-drilling were done. The underground work at that time aggregated nearly 7,000 feet.

It will be noted that early in this year, 1925, it was announced that ore had been struck in a diamond-drill hole from the No. 3 or lower tunnel.

This ore-body was further explored by drilling from the upper or No. 2 level, giving such promising results that the No. 3 level was extended with the idea of intersecting and exploring it. At the end of September the ore-body was encountered at 1,500 feet along the ore-zone from the Premier line and at a vertical depth of 650 feet below the surface. This ore-body had up to the end of the year been drifted on for 200 feet, demonstrating its size and values to be very satisfactory. The ore varies in width up to 15 feet and in one place assays $400 to the ton across 5 feet. The general run of the ore is a good milling grade, though there are high-grade shoots on it. One gave for a length of 30 feet $200 to the ton across 4 feet 6 inches of the vein. Ore is being sacked and shipped from this work since the first of 1926.

Diamond-drilling shows that the ore persists at 230 feet above the No. 3 level and may possibly extend through to the surface. It is a strong ore-shoot on the No. 3 level and therefore may consistently be expected to extend for some distance below it, making altogether a very gratifying ore-body after four years of exploration.

Lateral diamond-drilling indicates the presence of other ore-shoots, one having been cut 100 feet away, apparently paralleling the present one.

During 1925 a portion of the ore-zone dipping into the company's ground from the Premier ground has been diamond-drilled, resulting in the outlining of a commercial ore-body from 250 to 300 feet long.

There can be little doubt that the B.C. Silver is a mine, but it remains to be seen how big it will develop. To accomplish what has been developed to date has taken four years, 9,000 feet of underground work, and 15,000 feet of diamond-drilling. Additional equipment will now be installed, consisting of a 1,000-cubic-foot oil-driven compressor, and an electric storage-battery, underground haulage system, to facilitate further development.

Commendations and congratulations are due C. A. Banks, manager and engineer for the company, and C. B. North, superintendent at the mine. H. A. Gould is secretary of the company.

Premier Gold Mining Co., Ltd. This company was incorporated in 1919 with a capitalization of $5,000,000, divided into 5,000,000 shares. The first dividend paid by the company was $400,000 in 1921 and they now total $8,150,000, which includes $1,600,000 distributed this year. Approximately $19,000,000 worth of ore has been mined during that time, requiring some 6 miles of underground work and 12 miles of diamond-drilling. This year's development-works consist of 5,680 feet of drifts, raises, etc., and 13,500 feet of diamond-drill holes. The raise between No. 6 and No. 4 tunnels was completed and large ore-pockets and a well-lighted station cut on the No. 4 level. As the concentrator is fed from the No. 4 level, all ore must be delivered to that level. For this purpose a 100-horse-power double-drum electric hoist with protection and safety devices was installed in the No. 4 level station to hoist all ores produced from this to the No. 6 level. A station and ore-pockets were also cut on No. 5 level, an intermediate between Nos. 4 and 6. Drifting has been started on the No. 5 level toward the ore-bodies which have been outlined by diamond-drilling from No. 4 level.

As development-work had disclosed large ore-bodies of lower-grade ore which could be profitably milled, it was decided to increase the concentrating capacity to 400 tons a day. Exhaustive laboratory tests of the ore, confirmed by mill-runs, have resulted in a reduction in tonnage milled, but a better recovery of values. The new mill plant is essentially the same as the old plant and will consist, briefly, of a 6-inch gyratory crusher reducing a previously crushed mine-run ore to ¾-inch size. This is fed to an 8-foot by 36-inch Hardinge ball-mill operated in closed circuit with a drag classifier. The ball-mill product, after further classification in cones, goes to eight tables, which produces a high-grade concentrate, and from which the middlings and tailings are sent to a 5- by 8-foot regrinding ball-mill, operated in closed circuit with a cone. This cone will deliver a product which will be sent to two 12-cell sub-aeration flotation-machines. Any portion of the tailings proving of sufficient value will be cyanided. The new and old units are so arranged that the operation will be very flexible.

The aerial tramway has given very satisfactory service throughout the year, showing an operating record of 91 per cent. of the time on a twenty-four-hour basis, despite the fact that the traction and track cable on the loaded site were replaced with heavier cable. The ore and concentrates handled over it this year were 122,800 tons, or 14,000 tons in excess of last year. Up-freight amounted to an additional 8,700 tons. In the delivery of this ore the tram ran an aggregate distance of 50,000 miles, a distance equal to twice around the globe. The increased capacity has been made possible by a slightly increased speed and painstaking detail in systematizing the repair-work and operation.

In order to meet the added power requirement it has been necessary to increase the power plant. Consequently two new 360-horse-power Diesel engines, direct-connected to generators, have been installed; new generators have been secured for direct connecting to the old engines; another water-wheel has been installed; and seven panels have been added to the switchboard. In order to house these additions the power-house has been enlarged and the general arrangement altered to better operating conditions.

A new transformer-house has been built at Camp 4 to replace the old one and house both the old and new equipment. It was found, when considering the Diesel oil-storage problem, that better service could be obtained by shipping in the oil in large quantities. A new tank was therefore erected just above the dock at the lower terminal of the tramway, with a capacity of 20,000 barrels. This, with the existing tanks, gives a storage capacity of 1,200,000 U.S. gallons, which supply will meet all needs for approximately a year.

Safety-first work is carried on under a committee consisting of the heads of the departments, who receive suggestions from the employees, and a strict watch is maintained to keep all places in a safe condition. The company maintains a doctor at the plant and a well-equipped hospital is conducted at the mine for the more serious cases.

Good steam-heated, electric-lighted quarters with modern conveniences are maintained for the workmen and a good dry-and-change house, similarly modern, is available for their convenience.

The community spirit has maintained its high standard under the care of the Community Club, resulting in a first-class reading-room, local-talent shows, and tournaments of basket-ball, tennis, boxing, wrestling, quoit-pitching, etc. Recognizing this healthy growth and appreciating the limitations imposed on the club by its former quarters, the directors of the company authorized an enlargement of the Community Hall. It has therefore been made twice its former size, the ceiling raised, a gallery built, and furnished with a collapsible stage, which is removable when not needed.

The average number of men employed for the year was 302.

This year (1925) 168,557 tons of ore was mined, of which 89,219 tons of first-class shipping-ore was sent to Tacoma, 23,634 tons of second-class shipping-ore to Anyox smelter, and the remainder, 55,704 tons, was milled, producing 6,357 tons concentrates and 8 tons of precipitates shipped to Selby smelter. The total tonnage shipped was 119,218 tons, yielding 118,448 oz. gold and 2,263,556 oz. silver, a falling-off of 20,842 oz. gold and 651,826 oz. silver from 1924 figures. There was an increase of 9,543 tons of ore mined and 13,632 tons shipped over last year, with practically the same number of men employed underground. This tonnage was produced from all parts of the mine, from No. 4 level to the surface, both from old stopes and new ones opened up during the year—one on No. 1 level, one on No. 2 level, two on No. 3 level, and one on No. 4 level.

The personnel of the staff is the same as last year, with the exception of Harry Jackson, resigned. Dale L. Pitt, general manager; Bert F. Smith, assistant manager; Hector McDonald, mine superintendent; W. Asselstine, concentrator superintendent.

UNUK RIVER SECTION.

The reader is referred to the 1920 Minister of Mines' Report for a short article on this section. I have not heard of any prospecting in that area during 1925. Though geological conditions and therefore mineral potentialities are identical with the Salmon and Bear River valleys, the handicap of lack of transportation is prohibitive, so far as prospecting is concerned.

STIKINE AND LIARD MINING DIVISIONS.

These two Divisions comprise all the northern portion of the Province, except the Atlin Division, an area about 200 miles north and south by 350 miles east and west, or 70,000 square miles.

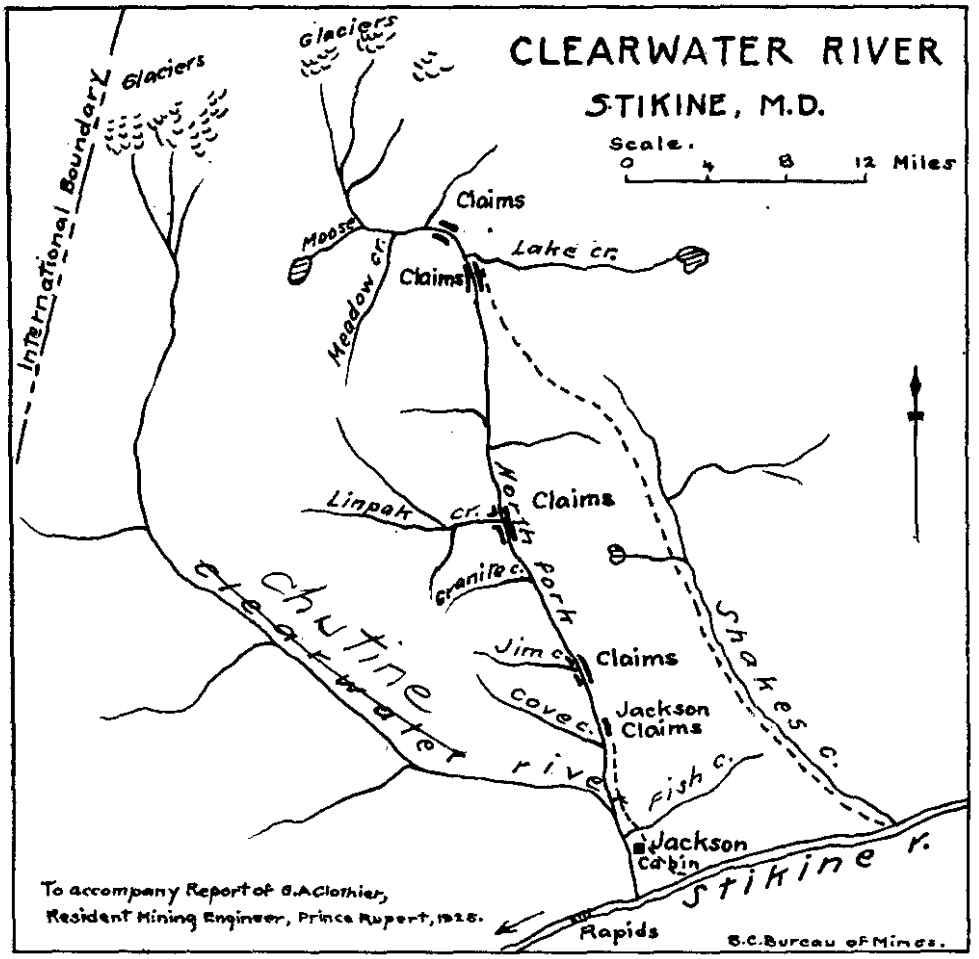
The Stikine Division is the drainage area of the Stikine river, which flows into the Pacific ocean at Wrangell, Alaska; 30 miles up from the mouth is the Alaska-British Columbia boundary-line. The Liard Division is the drainage area of the Liard river, comprising about 50,000 square miles lying on the Arctic slope, as the Liard river flows into the Mackenzie.

The country is little known except along the main waterway, but hydroplanes proved successful in 1925, and I think it will be only a few years until the country will have been well surveyed by that means.

This year has seen a start made on the exploration of this great area. Late in 1924 some gold was brought out from Gold Pan creek, which advertised itself to such advantage that in the spring of 1925 some 250 to 300 men went into that section, of which number about one-half stayed. While Gold Pan did not produce anything sensational, yet there was some gold recovered and, what was of most importance, considerable prospecting was done in other portions of that section.

There is every indication that a much greater number will go into that country in the spring of 1926. In addition to the prospecting, there has been a very substantial amount of equipment taken in for operations on Dease and Thibert creeks, flowing into Dease lake, and McDame creek, flowing into the Dease river.

The improvement of the Telegraph Creek–Dease Lake road has been most encouraging to prospective operators in that section. Further work will be necessary on the road early in the spring before the heavy traffic starts.



Altogether 521 oz. gold was produced this year from these Mining Divisions, which is the best for a number of years. Of this, 416 oz. came from Gold Pan creek, mainly from the discovery claim.

STIKINE RIVER SECTION.

The Iskut River section had practically no activity at all this year. No one had time to stop on the way through to Dease lake.

Clearwater River.—On this tributary of the Stikine from the north there has been an unusual amount of prospecting and some fair-looking gold prospects have been located. Some twenty-four claims were staked later in the fall. These are mostly on the small bars above the

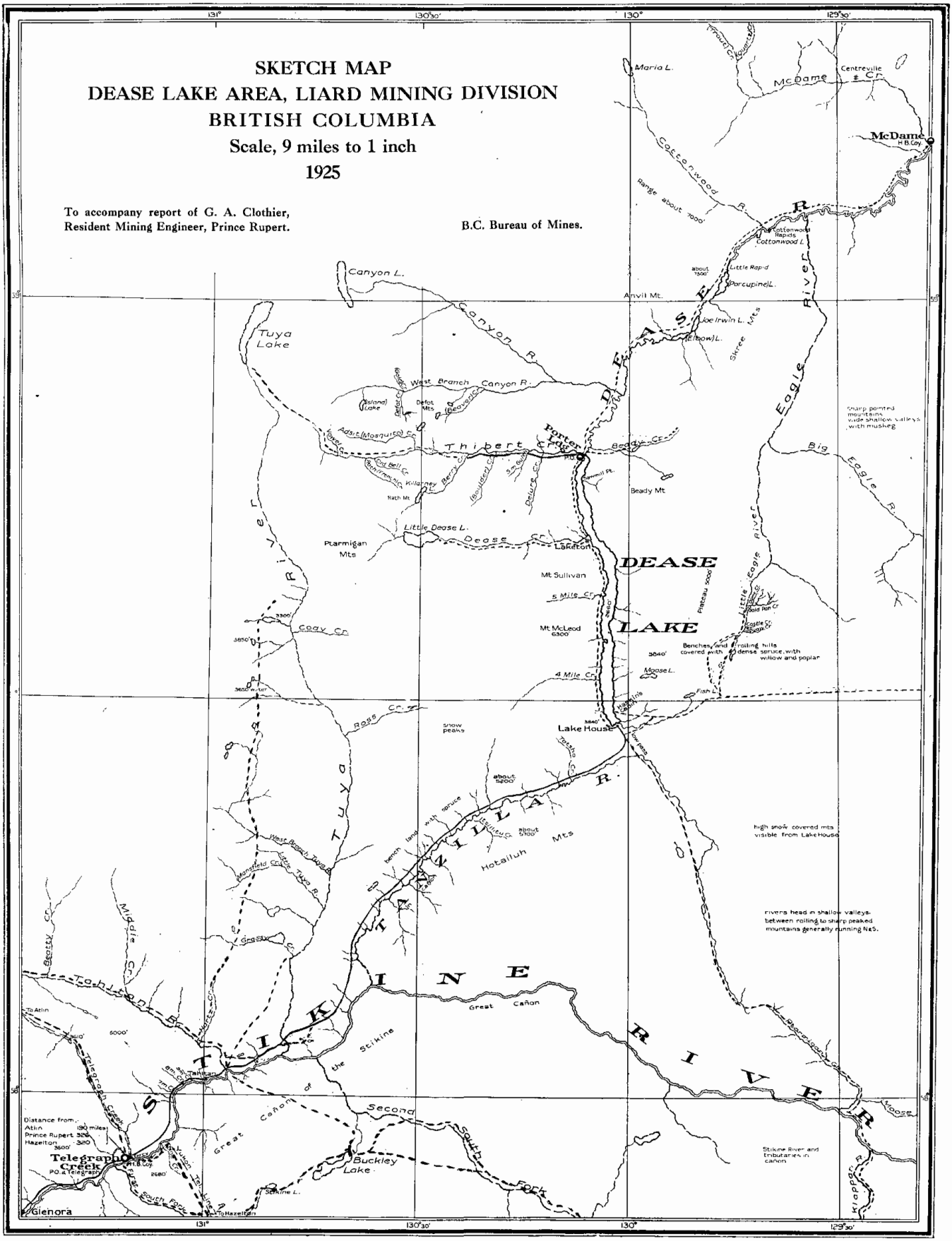
SKETCH MAP
DEASE LAKE AREA, LIARD MINING DIVISION
BRITISH COLUMBIA

Scale, 9 miles to 1 inch

1925

To accompany report of G. A. Clothier,
Resident Mining Engineer, Prince Rupert.

B.C. Bureau of Mines.



canyon, which unfortunately can only be worked during a short time of low water. About 40 oz. gold was taken out this year. Several prospectors are wintering there, so that there should be renewed activity in the spring, both in placer and lode prospecting.

There has been a little prospecting along the Stikine river, but nothing in proportion to the possibilities.

DEASE LAKE SECTION.

Gold Pan Creek.—The creek was worked up to early in September, when 416 oz. gold had been recovered by hand-sluicing. This was undoubtedly away below the estimate of some who led the stampede; nevertheless, it is indicative of gold in that section of the country. The majority of this, amounting to 242 oz., was taken from "discovery" by Grady, Ford, Grady, and Nesbitt. Four men on No. 1 above took out 57 oz.; two men on No. 14 above, 10 oz.; one man on No. 18 above, 2 oz.; one man on No. 21 above, 8 oz.; one man on No. 34 above, 3 oz.; and one man on No. 20 above, 4 oz.

On discovery claim the amount recovered was taken off a strip 105 feet long by 55 feet wide, the depth being from 3 to 5 feet. Top gravel carries a little fine gold, but on bed-rock gold is coarse, up to 2 oz.

The largest nugget, 3 oz., was found on Dome creek, No. 20 above. A shaft 32 feet deep failed to reach bed-rock. The bed-rock of Gold Pan has been proven very uneven. On discovery the wash is from 3 to 5 feet, while on No. 3 above no bed-rock was reached in 26 feet.

It looks as if the whole creek might make a good hydraulicking proposition, but very doubtfully profitable for individual hand-work.

Palmer Creek.—This is about 60 miles east and a little north of the head of Dease lake. It is fairly accessible by horse-trail from the Dease Lake trail, following the Gold Pan trail through to the Eagle river; thence around Gash mountain to the head of the Muddy river; thence down Muddy to the Turnagain and Palmer. The creek is about 10 miles long and flows into the Turnagain near the Muddy river.

Gold was found several years ago on this creek by O. C. Palmer, of Wrangell. Encouraged by the Gold Pan Creek finds, he and partner, A. R. Hall, went in again this year and brought out some gold. It is reported that his results enthused others in Wrangell to such an extent that late this fall another expedition went in and verified the first reports, staking a considerable portion of the creek. It is claimed to be larger than Gold Pan, with well-worn gravel benches, plenty of water and timber for all purposes, and gold distributed throughout the gravel. The best values were found about half-way up the creek. One party from Seattle has already (February 1st, 1926) gone in over the snow by way of Atlin.

Dease Creek.—This empties into the west side of Dease lake at Laketon, about half-way up the lake. The Dease Creek Mines Corporation was incorporated in Seattle with an authorized capital of $50,000, of which $15,000 was paid up, and registered in British Columbia in October, 1923. The company's holdings are up Dease creek and consist of leases Nos. 136 to 142, inclusive.

Under the supervision of Mr. Blick, a good road has been built from the mouth of Dease creek to the upper leases, about 6 miles, and the majority of the 50 tons of outfit landed on the ground. The delayed arrival of 30 tons of hydraulic pipe will take the greater part of the winter in putting it on the ground. Production is expected early next summer.

Dickinson Mining Co.—This company was organized in the State of Washington with an authorized capital of $25,000, of which $2,500 had been paid up, and was registered in the Province in December, 1923. The company took in a small sawmill last year and during the winter employed six men in getting out lumber for the flume and dam. These were built this season and a drag-line scraper outfit installed on their leases at the mouth of Dease creek. Work was completed and only a few days' run secured before the freeze-up, the results of which are reported as satisfactory.

Lease 103.—This is on Dease creek and is owned by Tom Bryan, who has taken in about 4 tons of hydraulic pipe, which will be installed this winter.

Thibert Creek.—The Dease Syndicate, operating on Thibert creek in 1919, 1920, and 1921, has only recorded assessment-work since that time.

On Deloire creek, a tributary of Thibert creek, Ball and Finn have installed a pulsometer pump and are this winter getting out timber for the construction of a flume.

On Mosquito creek, a tributary of Thibert creek, 12 miles up, H. S. Gibson, of Seattle, acquired the lease of Geo. Adsit and three adjoining leases. The ground was drilled this year and this fall a portable sawmill was taken to cut flume lumber this winter.

McDame Creek.

Pendleton Gold Mining Co., Ltd. This company was incorporated in the State of Washington and registered in the Province in 1920 with a capitalization of $500,000, of 500,000 shares, with its head office in Victoria. The company holdings consist of lease 69 at China bar, 11 miles up from the mouth of McDame creek. In 1924 a road was built from the mouth of the creek and 45 tons of machinery, consisting of a drag-line scraper outfit, taken in from Telegraph Creek and set up on the ground.

This spring a start was made as early as weather conditions permitted and a pit 20 by 20 feet by about 18 feet deep taken out on the upper end of the Pendleton lease. Gold to the amount of 12 oz. was recovered, but water prohibited further work. It therefore became necessary to put in a bed-rock drain in order to work the ground. This was accordingly started about 2,000 feet lower down the creek. When this work had obtained in depth of about 16 feet a pay-streak was struck, which yielded 16 oz. gold on September 3rd, the last day's operations because of the freeze-up. The company is greatly encouraged by the eleventh-hour discovery and very optimistic for next year.

Lease 153.—This is on Quartz creek, a tributary of McDame, and is owned and operated by D. L. Wing. He took out only 10 oz. gold through being handicapped by lack of hydraulic pipe, which he was unable to get in from Telegraph Creek.

Standard Mines Corporation. This is a State of Washington incorporation with an authorized capital of $250,000, fully paid. It was registered in the Province in September, 1925, with its head office in the London Building, Vancouver. It has been operating the *Big Missouri* property in the Portland Canal section this year. The corporation's holdings in this section consist of leases Nos. 146, 147, and 148 on McDame creek, acquired from Clayton Leeds. Under the direction of B. J. O'Reilly, a No. 3 Keystone drill was brought in this summer and the ground will be thoroughly tested this winter.

Stewart Consolidated Gold Mines, Ltd. This company was incorporated in December, 1924, with a capitalization of $2,000,000, divided into 2,000,000 shares, with its registered office in the Hamley Building, Victoria. The principal properties of the company are in the Portland Canal country. In 1925, under the direction of J. H. Hawthornthwaite, investigations were carried out on the lower Dease river and the Liard river, resulting in the application for nine leases on McDame creek. The manager announces that the ground will be tested by drilling this coming season.

Mineral-showings are not being overlooked, for there were some claims staked on McDame creek and on the Muddy river, and a few on the Iskoot as well.

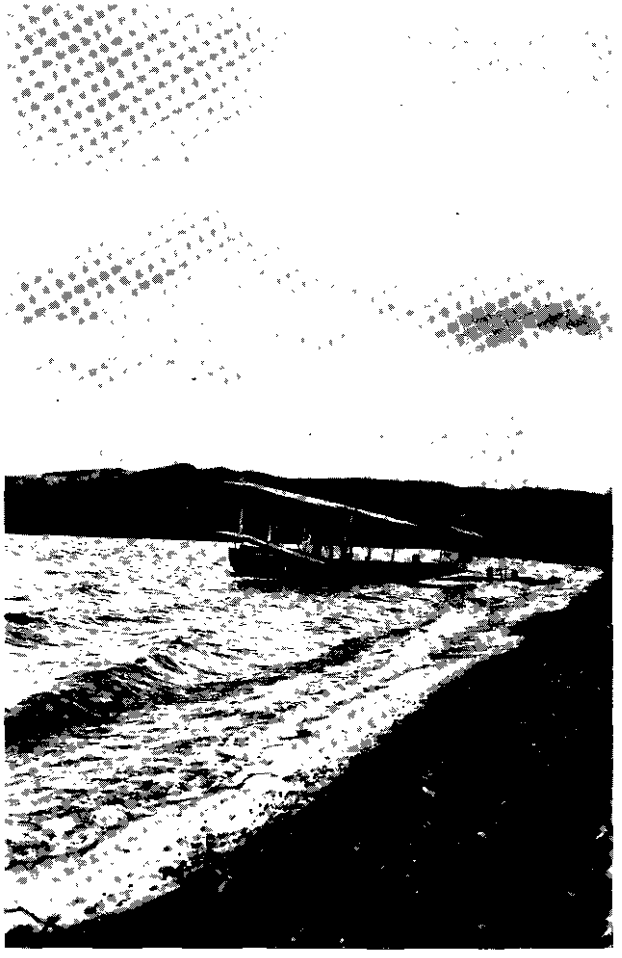
ATLIN MINING DIVISION.*

This Division, comprising the north-west corner of the Province, has had a marked increase in mining activities this year. The placer production of $49,229, while below normal, under the circumstances is very gratifying. Some important preparation-work was done in 1925 which should increase the output for some time to come. The work done on Ruby creek will bear fruit next year. The installation of the plant on Pine creek gives every reason to expect a very substantial output from that property. I am informed that new operations will be undertaken on Otter creek. Exploratory work on upper Spruce creek has exposed good "pay," which will be recovered when drainage facilities have been provided.

Lode-mining is coming into its own since the *Engineer, Gleaner, Kirkland,* and Atlin Silver-Lead have resumed operations and are developing favourably.

The year 1925 is the best the Atlin Division has had for many years and the future looks very promising. Nothing has been reported from the Taku Arm section, which offers an accessible and favourable area for prospecting.

* Atlin District, Memoir No. 37, by D. D. Cairnes, Geological Survey, Canada.



Hydroplane. Dease Lake, Liard M.D.



Engineer Gold Mines, Ltd., Atlin M.D.

RAINY HOLLOW SECTION.

Some claims were staked during 1925 across the Klehini river and near Pleasant camp, the staker doing some little work on them. The showing is a quartz vein in granite country-rock, carrying fair gold values.

Nothing of importance has been done on the *Maid of Erin*, which was partially developed by Robert Wiley four years ago, but who found transportation facilities impossible for profitable mining at that time. Since then the Alaska Government has expended a large amount in putting in a first-class truck-road from Haines to the boundary-line. (*See* under "Prospecting.") The completion of the 12 miles of road in British Columbia would give the country a chance for development.

ATLIN AND TAGISH LAKES SECTION.*

Engineer Gold Mines, Ltd.

(*See* Minister of Mines' Report, 1924.) This company was incorporated in the State of Delaware with a capitalization of $1,000,000 and in May, 1924, was registered in British Columbia. The properties consist of the *Engineer* group of eleven claims. During 1925, under the energetic and efficient management of Arthur C. Brinker, a great deal has been accomplished. Additions and improvements have been made to the camp in general, with special attention to the convenience and comfort of the employees. The power plant has been enlarged, the concentrator has been remodelled, and the crushing plant increased, as the result of data gained from experimental runs of ore. A large amount of underground work has been done along a definite plan of development.

The enlargement of the power plant consists of the building of a dam across the Wann river higher up than the old intake at the head of the pipe-line. From the dam a 36-inch wood-stave pipe-line 3,500 feet long was laid, delivering water at 250 feet head to the present generating plant. From the plant a 3-wire transmission-line connects with the compressor and lighting plant at the mouth of the working-tunnel. Everything, including the underground workings, is electric-lighted.

The concentrator was complete and under steady operation by November 1st. The improved flow-sheet (*see* cut) consists of a 50-ton-capacity ore-bin at the head of the mill for mine-run ore. From this the ore passes to a 7- by 11-inch Dodge crusher, reducing it to ¾-inch size; thence to crushed-ore bin, from which it is fed by two 6-inch automatic plunger feeders to two 4- by 4-foot ball-mills, which grind to 120-mesh. These are in closed circuit with 30-inch Aikens classifiers, from which the undersize is fed to amalgamation-plates, the oversize going to a 12- by 7-inch bucket elevator to a 3-foot by 6-inch improved impact screen, from which the undersize goes to the plates and the oversize is returned to the ball-mills.

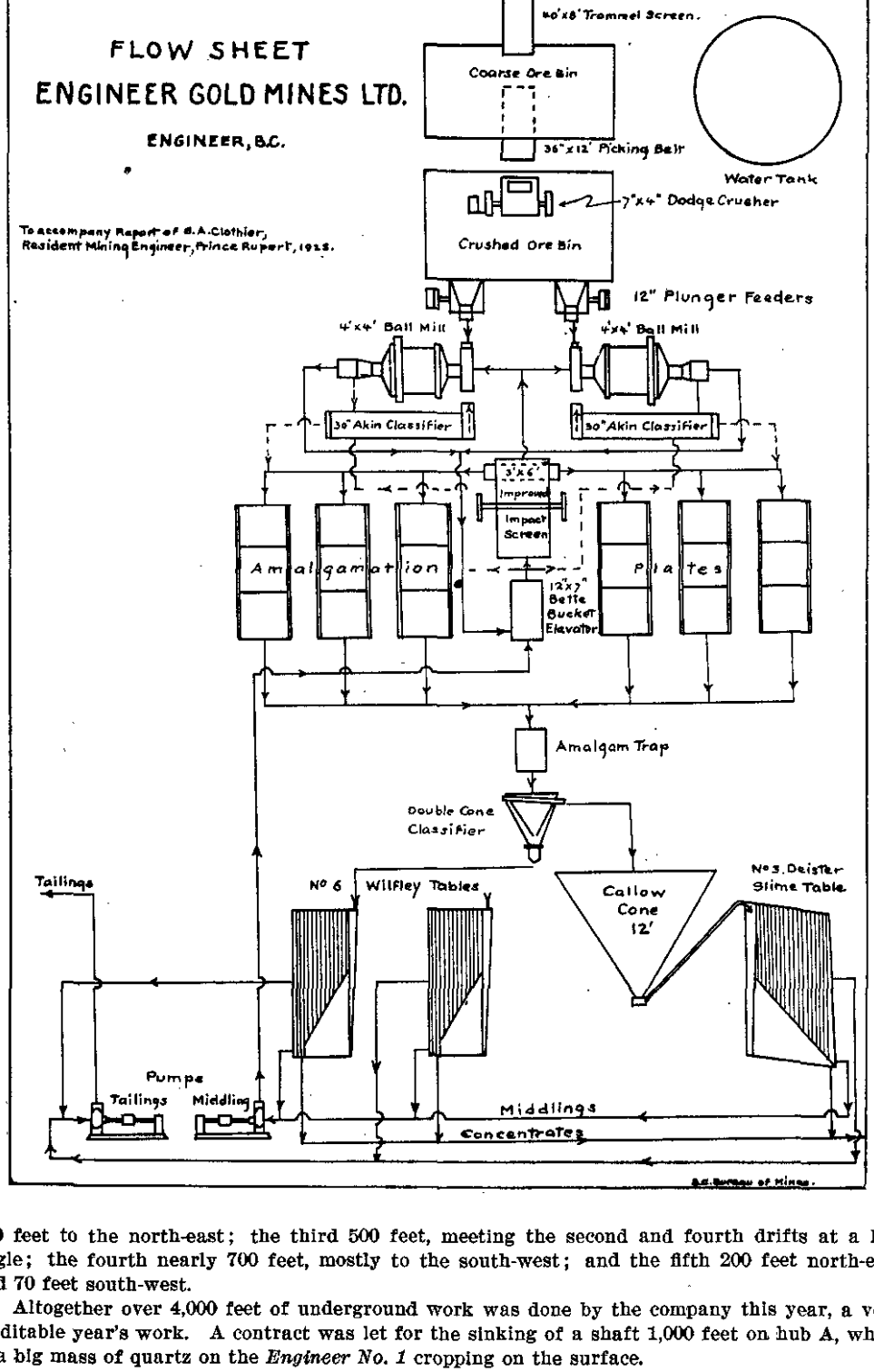
After leaving the amalgam-plates the ore passes through an amalgam-trap; thence to a double-cone classifier, from which the overflow runs to a 12-foot Callow dewatering-cone; thence to a Deister sluice-table; the settling from the double cone going to two No. 6 Wilfley tables. The middlings from all the tables go to a middling-pump and sent to the elevator to screen to ball-mills. The table tailings go to tailing-pump to lake.

The underground work up to the end of 1924 had just put the working-tunnel under the old shaft on the No. 7 or E vein. This year (1925) the connection was made through from the No. 5 or working-tunnel level to the bottom of the shaft. E vein was drifted on both ways. The south-west drift was run about 550 feet. At 230 feet from the shaft the vein split and a drift was run 150 feet on the east fork, which corresponds to surface croppings. At 250 feet from the shaft a raise was put up to No. 4 level, which had been extended from the shaft to about 400 feet. Several other raises are being put up on ore-showings in the roof of No. 5 level.

The north-east drift of the fifth level was driven about 1,300 feet, cutting several small quartz stringers, and encountered at 1,050 feet from the shaft the "Mickey" vein of the north-south series of veins on the upper portion of the property. The Mickey vein had been drifted on 300 feet to the north and about 250 feet to the south when I was on the property. Some fine ore had been struck in places along this vein, but none had been explored at that time.

In the main working-tunnel five or six veins were crossed before reaching the E vein. These have been drifted on this year; the first one about 150 feet to the south-west; the second about

* Minister of Mines' Report, 1918.



400 feet to the north-east; the third 500 feet, meeting the second and fourth drifts at a low angle; the fourth nearly 700 feet, mostly to the south-west; and the fifth 200 feet north-east and 70 feet south-west.

Altogether over 4,000 feet of underground work was done by the company this year, a very creditable year's work. A contract was let for the sinking of a shaft 1,000 feet on hub A, which is a big mass of quartz on the *Engineer No. 1* cropping on the surface.

Though the company's stock reached the unwarranted price of over $100 a share in New York this summer, there were no sensational developments whatever in the mine. Many short ore-shoots have been drifted through in different parts of the mine, but none have as yet been explored to disclose any substantial tonnage of milling-ore, and until such tonnage is exposed underground the speculative element remains.

The visible merits of the property consist of: The number of veins (probably twenty-five) in which gold has been found both on the surface and in underground drifting; the bonanza values found in places; and its general favourable physical conditions. Its prospective merits depend on the probability of the recurrence of these (so far) short lenses of ore; their frequency, which will govern the development costs; and, of course, the values. There are practically no values between the ore-lenses.

The output for 1925 was 1,700 tons mined and milled, producing 1,814 oz. gold and 843 oz. silver. Any concentrates made are being stored until navigation opens next spring.

Gleaner Consolidated Gold Mines, Ltd. This company was incorporated in November, 1922, with a capitalization of $1,000,000 divided into 4,000,000 shares of 25 cents each, with its registered office in the Union Bank Building, Vancouver. The properties of the company consist of the three Crown-granted mineral claims, Lots 239, 240, and 241, known as the *Gleaner* group, adjoining the *Engineer* group on the east, up the hill. The geological features are similar to the *Engineer* ground. Work was started this spring with O. B. Smith manager at the mine.

The road from the *Engineer* dock to the *Gleaner* camp and upper tunnel was repaired. The summer's work consisted mainly of surface prospecting and altogether there has been about 700 feet of open-cutting, 400 feet of tunnelling, and 50 feet of sinking done. Some fourteen veins have been indicated on the surface, all striking in a general north-south direction. A good camp has been built and an Ingersoll-Rand compressor of 175 cubic feet capacity, driven by a 36-horse-power Petter engine, installed.

The crosscut tunnel started at the lower boundary of the claims will be continued this winter a further 1,000 feet to cut the whole north-south series of veins. Free gold has been found on four of these veins on the surface and they will no doubt be drifted on if cut in the tunnel. Further development will of course be governed by the information gained in the crosscut tunnel.

Kirkland Gold Mines, Ltd. This company was incorporated in July, 1925, with a capitalization of $1,000,000, divided into 2,000,000 shares of 50 cents each, with its registered office in Victoria. The property contains six claims south of and adjoining the *Engineer* group, along the shore of the lake. Physical and geological conditions are similar to the *Engineer* and *Gleaner* groups. Very little prospecting or development-work has been done. The company did not do any work on the property this year.

Other Properties.—There are in the vicinity of the *Engineer* mine a number of properties reported on in 1918 on which nothing of importance has developed since. These are: *Venus* group and *Venus Extension* group, on Windy arm of Tagish lake; *Sweepstake* group, adjoining the *Engineer; Happy Sullivan* group, on Sheep creek north of the *Engineer* and about 1½ miles from the lake; *Brown* group, about half a mile up the Wann river; *White Moose* group, across the lake and a little south of the *Engineer; Rupert* group, above the *White Moose; Laverdiere* group, a copper-showing on West bay at the south end of West channel, an arm of Atlin lake; *Callaghan* group, adjoining the *Laverdiere; Big Horn* and *Spokane* groups (*see* 1921 Report), on Big Horn creek, 10 miles up from Lawson's cabin on the west side of Taku arm, opposite Golden Gate.

Atlin Silver-Lead Mines. (*See* 1924 and previous reports.) There are twenty-four claims and fractional claims in this group, owned and operated under a declaration of trust by J. M. Ruffner, of Atlin. There is also the Ruffner group of nineteen claims adjoining this, owned by J. M. Ruffner. Both holdings are now under lease to the Federal Mining and Smelting Company, which is financing and directing the work under the supervision of J. M. Ruffner. The properties are situated on Vaughan mountain, about 10 miles up Fourth of July creek and 14 miles by wagon-road from Atlin. The portion of the road from the main road up Fourth of July creek is at best only a temporary convenience. The claims of the Atlin Silver-Lead Mines were surveyed this year.

By reference to previous reports it will be seen that an appreciable amount of work has been done, mainly on No. 2 and No. 4 veins, with increasingly encouraging results. The prevailing

country-rock of granite has been intruded by a number of parallel dykes cutting into the hill, forming lines of weakness for subsequent shearing action and mineralization. These fissures are up to 14 feet in width, heavily oxidized on the surface, and, as later work has shown, extending to some considerable depth and necessitating a lot of work to get any conclusive results.

This spring the compressor was transferred from the shaft at 2 C and installed at 4 A, where a tunnel had been driven 70 feet in highly oxidized vein material. At the time of my examination at the end of October this tunnel had been driven to over 300 feet in fairly solid vein-matter from the end of the old tunnel. For about 75 feet from the old face there is an average of about 3 feet in width of ore of an average value of about $2 in gold to the ton, 25 oz. in silver to the ton, and 5 per cent. lead. It is therefore safe to figure a commercial ore-shoot of over 100 feet in length. Beyond this point the values diminish to a non-commercial grade, though the vein continues. The continuity of the vein was proven by an open-cut about 75 feet west of the mouth of the tunnel, but no values of importance were found on the surface at this point. Good ore, averaging 0.13 oz. in gold to the ton, 20 oz. in silver to the ton, and 16 per cent. lead, across 5.4 feet, was found in a cut 4 AA, about 1,800 feet farther up the hill from the tunnel, on the strike of the vein and supposedly the same. This tunnel will no doubt be continued in the expectation of encountering other ore-shoots.

The discovery made last fall on No. 2 vein at 4,600 feet elevation, or about 600 feet above the base of the mountain, has received considerable attention this year. An open-cut on the brow of the hill, about 500 feet vertically above the 2 X tunnel, exposes the vein, 8 to 9 feet in width and sparingly mineralized, and is important in that it establishes the continuity of the No. 2 vein from the upper workings at the shaft to the lower tunnel at 2 X.

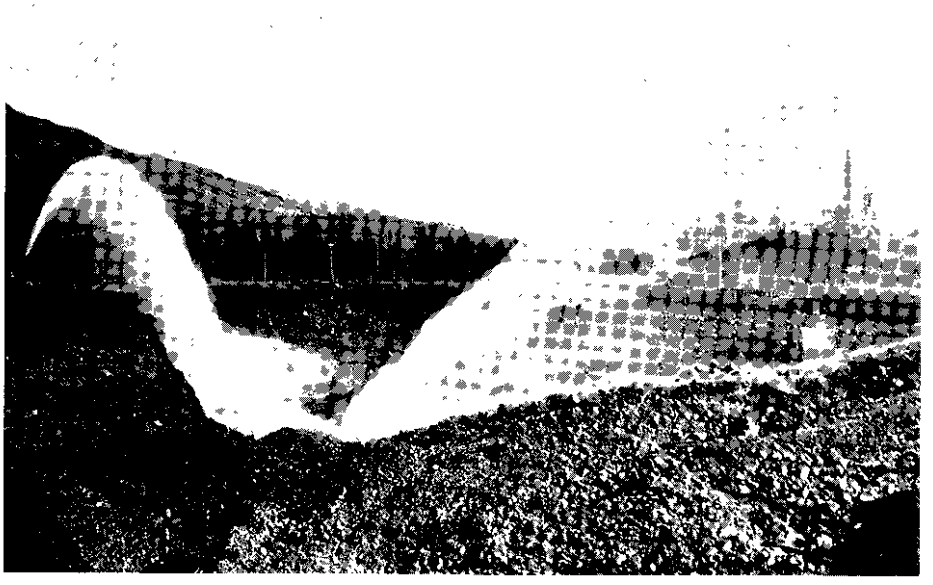
At the lower discovery five trenches were put in across the strike of the vein, the higher three exposing the vein at their upper ends. The two lower cuts, and especially the one nearest the tunnel, exposes some very fine ore, assaying high in silver, across a width of about 20 feet. The average sampling of this by the manager assayed 118.9 oz. in silver to the ton and 11.7 per cent. lead. About 60 feet west of and below this cut a tunnel was driven 39 feet (October 21st, 1925) diagonally across the formation, cutting a vein at 25 feet from the portal, and continued another 14 feet to the granite. A short drift had been run on the vein for 15 feet, showing its strike to be N. 45° E. (mag.) and dip about 70° to 75° N.W. In the face the vein is 2½ feet wide, composed of heavy sulphides, showing galena, sphalerite, and arsenopyrite, in which, particularly on the seam-faces, was an appreciable amount of ruby silver. A sample of the galena assayed 535 oz. in silver to 71.8 per cent. lead. Ten tons of ore was sorted and shipped from this drift, from which the smelter returns were 1.1 oz. in gold to the ton, 199.76 oz. in silver to the ton, 6.2 per cent. lead and 3 per cent. zinc, netting about $100 a ton after all freight and treatment charges had been paid.

On the hanging-wall side of the vein a dyke about 12 feet wide was crossed, on the hanging-wall of which is a foot or two of soft gouge between the dyke and the granite. The granite appears to be cutting over to the left in the face of the short drift on the gouge.

I am informed by Mr. Ruffner that a portable compressor was set up and housed at the mouth of the 2 X tunnel and the drift on the vein had been extended to over 100 feet at the end of 1925. It follows the contact of the granite and dyke all the way, having encountered the granite on the right-hand side in a short distance. There has been more or less ore all the way, containing very little galena, considerable arsenopyrite, some sphalerite, and some chalcopyrite. At 75 feet in the drift from the crosscut tunnel a crosscut is being driven to cut under the ore-outcrops exposed on the surface.

At 4,375 feet elevation, or 225 feet lower than the 2 X tunnel, the bluff has been faced up and another tunnel started on the vein, which can be readily traced down the hill by the dykes. The tunnel has been started on a 2-foot vein, on which it is proposed to drive about 50 feet and then crosscut to the right, across the whole vein-carrying formation as exposed in the work in and above the 2 X tunnel.

A good camp to accommodate eighteen men has been built at the edge of the timber, at 3,950 feet elevation, about 400 feet below the last-mentioned tunnel. A good wagon-road was built from the old road to the new camp and from there on up the hill to the 2 X tunnel. Work is being carried on all winter both at the lower tunnel and in the 4 A tunnel, just below which there is another good camp. Mr. Ruffner, owner and resident manager, is staying on the job all winter.



Discovery Mining & Power Co., Pine Creek, Atlin M.D.



Goldpan Creek, Liard M.D.

This year's work has greatly added to the probabilities of the property. The work on No. 4 vein indicates an ore-body, at least 100 feet long, of commercial ore, which it is reasonable to expect will improve at depth. Other ore-bodies may be expected as this vein is developed.

No. 2 vein has been practically proven continuous for a mile and has had substantial showings of high grade at elevations varying from 4,600 feet at the lower tunnel to over 6,000 feet at the shaft.

For the amount of underground work done there has been exposed a very appreciable amount of ore even under the unfavourable conditions of deep oxidation. The property has great prospective merit.

PLACER-MINING.

The output from this class of mining has been below normal this year, due to the non-production of Ruby and Otter creeks.

Spruce Creek.—Isaac Matthews is the principal producer on this once famous creek. Shafts sunk to rim-rock on upper Spruce show good "pay," but nothing can be done on bed-rock until some system of drainage is provided through the lower ground, the greater part of which is worked out.

Pine Creek.—Little has been done on this creek for the past few years until this year. The largest nugget ever found in the Atlin district was picked up on an old tailing-dump this summer. It weighs 49 oz. and contains considerable quartz. The gold is estimated at between $500 and $600.

Discovery Mining and Power Co., Ltd.

This company was incorporated in 1918 with a capitalization of $20,000, divided into 2,000 shares, and acquired the holdings and plant of the North Columbia Gold Mining Company, the Pine Creek Power Company, the O'Donnell Placers Company, and the Columbian Mines Company. During 1925 the property was bonded by Chas. V. Bob, of New York, under whose option the *Engineer* is now being developed. Under the efficient direction of Andrew Sostad, with Walter Sweet as foreman, a complete hydraulic plant was installed this season on lower Pine creek. Water had to be obtained from the lower end of the old Ruffner ditch, which leads from Surprise lake. From the end of the ditch to the pressure-box at the head of the pipe-line some 1,700 feet of ditch and 700 feet of flume were constructed in order to reduce the pressure to a 375-foot head at the pit. The pipe installation from the pressure-box to the pit required 13,000 feet of pipe, starting with 36-inch and stepping down to 34-inch, 32-inch, 30-inch, 28-inch, 26-inch, 24-inch, 22-inch, 20-inch, 18-inch to 16-inch at the monitors. There are two lines to two monitors in the pit from a Y about 15 feet back. Above the Y are two branch lines, one for the power plant to supply compressed air and electric lights and the other equipped with a 7-inch nozzle for water-control when either pit monitor is out of action.

All parts of the plant are connected by telephone. When it is realized that this pipe-line was laid with old pipe that had been in use for years, and scattered all over the country as far as O'Donnell creek, the task of assembling and installing it can be appreciated.

A start was made this fall and some 300,000 yards of gravel was moved to make room for sluice-boxes when operations are resumed in the spring, which is generally about the first of May, the season extending to the freeze-up, usually about the middle of November, though operations could have been carried on all this winter on account of the abnormally mild weather.

About thirty men have been steadily employed all summer and Mr. Sostad certainly is deserving of great credit for the completion of such an undertaking in one season.

The ground to be hydraulicked is all virgin ground, and while little is known of the lower end of it, the upper end is estimated as very promising. The lower end will probably yield enough to cover operating expenses for the first year or two, after which better ground will be entered. With profitable results this enterprise will continue for a number of years.

Ruby Creek.—The Placer Gold Mines Company has this year been driving a bed-rock flume in preparation for further operations on the lower end of the creek. It is expected that sluicing will be started early next season.

Otter Creek.—The Mines d'Otter Creek, under the management of Henri Maluin, did not have a very successful season so far as production was concerned.

McKee Creek.—The Delta Gold Mining Company's ground was again worked this year by Geo. Adams. I have not the output, but I know that operations and results were much more satisfactory than last year.

NORTH-EASTERN MINERAL SURVEY DISTRICT (No. 2).

BY DOUGLAS LAY, RESIDENT MINING ENGINEER.

INTRODUCTORY.

The North-eastern Mineral Survey District consists of Omineca, Cariboo, Quesnel, and Peace River Mining Divisions, and occupies a large portion of Northern British Columbia, having an area of nearly 100,000 square miles. The northern, western, and southern boundaries of this district are the arbitrary boundary-lines of the Mining Divisions, but these, where practicable, always follow the watersheds of the country. The eastern boundary is the British Columbia-Alberta boundary-line. The western boundary is roughly 100 miles from the Coast, while the northern and southern boundaries are about 200 miles from the respective Provincial boundaries.

For descriptive purposes in this report the district is reviewed under the main headings of the Mining Divisions, subdivided into sections as follows:—

Omineca Division—Skeena section; Hazelton section; Telkwa section; Houston section; Burns Lake section; Sibola section; Manson section.

Cariboo Division—Barkerville section; Fort George section.

Quesnel Division—Quesnel section; Likely section; Horsefly section; Keithley section.

Peace River Division.

A general description of the geographic, geologic, and topographic features of the district was given in the Annual Report of the Minister of Mines for 1917. In the following table is given a list of the more important reports on this district, in addition to which numerous references can be found in the Summary Reports of the Geological Survey and the Annual Reports of the British Columbia Department of Mines:—

LIST OF REPORTS ON DISTRICT.

Name of Author.	Publication.	Year.	Page.
Dr. Geo. Dawson	Geological Survey of Canada	1875	233
Dr. Geo. Dawson	Geological Survey of Canada	1876	17
Dr. Geo. Dawson	Geological Survey of Canada	1879	Pt. B
Dr. Geo. Dawson	Geological Survey of Canada	1888	73R
Amos Bowman	Geological Survey of Canada	1887–8	Pt. C
R. G. McConnell	Geological Survey of Canada	1894	5c
W. Fleet Robertson	Minister of Mines' Report	1905	89
W. Fleet Robertson	Minister of Mines' Report	1906	101
W. Fleet Robertson	Minister of Mines' Report	1908	66
W. Fleet Robertson	Minister of Mines' Report	1911	95
W. Fleet Robertson	Minister of Mines' Report	1912	65
W. W. Leach	Geological Survey of Canada, Summary Report	1906	35
W. W. Leach	Geological Survey of Canada, Summary Report	1907	19
W. W. Leach	Telkwa River and Vicinity, Geological Survey	1907	.....
W. W. Leach	Geological Survey of Canada, Summary Report	1908	41
W. W. Leach	Geological Survey of Canada, Summary Report	1909	61
W. W. Leach	Geological Survey of Canada, Summary Report	1910	91
G. S. Malloch	Geological Survey of Canada, Summary Report	1911	92
R. G. McConnell	Geological Survey of Canada, Summary Report	1912	55
G. S. Malloch	Geological Survey of Canada, Summary Report	1912	69
G. S. Malloch	Geological Survey of Canada, Summary Report	1912	103
C. F. J. Galloway	Minister of Mines' Report	1912	118
W. M. Brewer	Minister of Mines' Report	1914	101
John D. Galloway	Minister of Mines' Report	1914	176
J. D. MacKenzie	Geological Survey of Canada, Summary Report	1915	62
Chas. Camsell	Geological Survey of Canada, Summary Report	1915	70
John D. Galloway	Minister of Mines' Report	1916	134
John D. Galloway	Minister of Mines' Report	1917	86
John D. Galloway	Minister of Mines' Report	1918	107

LIST OF REPORTS ON DISTRICT—*Continued.*

Name of Author.	Publication.	Year.	Page.
B. R. MacKay	Summary Report, Part B, Geological Survey	1918	39
J. J. O'Neill	Memoir 110, Geological Survey	1919	.....
B. R. MacKay	Summary Report, Part B, Geological Survey	1919	36
John D. Galloway	Minister of Mines' Report	1919	96
J. C. Gwillim	Oil Survey, Peace River Dist., Dept. of Lands	1920	.....
John D. Galloway	Minister of Mines' Report	1920	79
John A. Dresser and Edward Spieker	Oil Surveys, Peace River Dist., Dept. of Lands	1920	.....
Leopold Reinecke	Memoir 118, G.S.C.	1920	.....
F. H. McLearn	Summary Report, Part B, G.S.C.	1920	1
R. W. Brock	Summary Report, 1920, Part A, G.S.C.	1920	81
John D. Galloway	Minister of Mines' Report	1921	89
W. A. Johnston	Summary Report, Part A, Geological Survey	1921	59
John D. Galloway	Minister of Mines' Report	1922	95
John A. Dresser	Oil and Gas in Peace River, Summary Report	1922	.....
W. A. Johnston	Summary Report, Part A, Geological Survey	1922	68
W. L. Uglow	Summary Report, Part A, Geological Survey	1922	82
F. H. McLearn	Summary Report, Part B, Geological Survey	1922	1
John D. Galloway	Minister of Mines' Report	1923	95
George Hanson	Summary Report, Part A, Geological Survey	1923	29
John D. Galloway	Minister of Mines' Report	1924	85
George Hanson	Summary Report, Part A, Geological Survey	1924	19, 38
M. E. Hurst	Summary Report, Part A, Geological Survey	1924	44
J. R. Marshall	Summary Report, Part A, Geological Survey	1924	47

GENERAL SUMMARY.

In the North-eastern District during 1925 there has been every evidence of recovery from the depression prevalent during the latter part of 1924. Widespread activity has been apparent in both lode- and placer-mining fields and much attention has been devoted to the district by examining engineers. At the close of the year there seems every justification to anticipate next year an increase in the production of these properties already under operation. Further, the interest evinced in the district by outside capital and the very favourable metal market incline the belief that new properties will be opened up in the near future.

As the result of examinations this year several deals have been reported. Of these, the most important is the fact that the British Canadian Silver Corporation, Limited, has taken an option on the Schufer properties on Hudson Bay mountain.

LODE-MINING.

Undoubtedly the most noteworthy event in lode-mining was the resumption of operations by the Duthie Mines, Limited, at the *Henderson* property on Hudson Bay mountain in June, followed later by development of the adjoining *White Swan* group. Very shortly after resumption this company commenced to ship ore at the rate of about 6 tons daily. Its shipments for the year total over 750 tons. This tonnage would have been exceeded had not unusually mild weather towards the end of the year seriously impeded transportation of ore from mine to railway.

The small-scale operations during the year, in the way of shipments and development-work beyond mere assessment-work, are noteworthy:—

At the *Valhalla* and *Kleanza* groups, Usk, small-scale development.

At the *Fiddler* group, Dorreen, a force of twelve men was continuously employed on development during the summer and early fall.

One hundred and fifty feet of drifting was done on the property of the New Hazelton Gold Cobalt Mines, Limited, on Rocher Déboulé mountain, in the course of which some 30 tons of ore was extracted and sacked.

At the *Brunswick* group, Rocher Déboulé mountain, the owner, J. Miller, worked most of the year.

At the *Mohawk* group, Four-mile mountain, W. S. Harris and associates connected the lower crosscut tunnel with the upper workings and shipped approximately 20 tons of ore.

From the *Silver Cup* on Nine-mile mountain W. S. Harris and associates shipped 50 tons of ore.

At the *Sunrise* on Nine-mile mountain W. S. Harris carried out 200 feet of drifting under contract.

At the *Cascade* and *Groundhog* groups on Hudson Bay mountain Alex. S. Millar and associates employed a force of three men constantly on development.

At the *Silver King*, in the Babine mountains, P. J. Higgins was engaged all the season with a force of three men in running a crosscut tunnel. He reported an important strike of high-grade ore in December and anticipates being able to make a shipment during the winter.

The *Rainbow* group, Babine mountains, was bonded in August to Frank H. Taylor, of Smithers, who has been carrying on development-work at the rate of fifty shifts a month. Results are said to be satisfactory.

The Silver Island Mining Company, Babine lake, started active development this spring with a force of twelve men, using drills operated by steam. The Taltapin Mining Company, in the same district, carried on a considerable amount of development during the first half of the year.

In the most northerly portion of the North-eastern District the General Holding Company, of Edmonton, has had since the early spring a force of ten men employed at its mica properties near Fort Grahame. It is expected that operations will be continued all winter and that shipments of the product will be made in 1926.

Among field engineers who visited the district during the year may be mentioned the following:—

Charles T. Cabrera employed several men investigating placer possibilities along the Skeena river, in the Manson section, in the Quesnel Mining Division at Cedar creek, and himself carried out the sampling of certain gravel-bars in the Skeena river in the immediate vicinity of Hazelton, where he staked several leases.

A. H. McLoughlin, accompanied by O. C. Thompson, representing Porcupine Goldfields Development and Finance Company, made an extended stay in the district, examining various properties and also taking a trip into the Manson section.

Alfred R. Whitman, of the University of California, accompanied by A. H. Case and H. Heide, made a reconnaissance of the central portion of the Omineca Mining Division, including portions of the Manson section.

L. Levensaler, of Seattle, Wash., examined the property of the Babine Bonanza Mining and Milling Company.

C. A. Banks, in company with C. North, examined the Schufer property.

F. Gross, acting on behalf of the Belmont-Surf Inlet Mines, Limited, examined several properties in the vicinity of Usk.

W. J. Elmendorf examined the *Valhalla* and *Kleanza* groups.

Among those who made a number of examinations in the district were Arthur W. Jenks, J. H. Rodgers, and H. L. Batten.

George Hanson and staff, of the Geological Survey of Canada, were engaged in an examination of Hudson Bay mountain and the region in the vicinity of Usk.

Of importance to the district is the fact that the Consolidated Mining and Smelting Company of Canada now accepts concentrating-ores, and also the recent announcement by the Canadian National Railways of a material reduction in freight rates on ores between the various shipping-points of the district and Trail.

In regard to the former, the Consolidated Mining and Smelting Company has kindly supplied the following information:—

"We have no schedule applying to concentrating-ores. The practice is to take a sample from each shipment, to put it through our laboratory machine, from this test to estimate the probable savings in the mill, and then to settle outright on the estimated concentrates under our regular ore schedules (Schedule G, Lead Ores, dated February 9th, 1925; Schedule B, Zinc Ores, dated February 11th, 1925). We have no schedule for copper ores. We quote on each one singly, according to its constituents. If the prospective shipper wishes to send a sample to be tested, we are glad to do it and make a *pro forma* based on this test. Though we can get along on a 25- to 30-lb. sample, it is better to send 50 lb., in case we do not have luck in hitting the proper treatment early in the course of the experiments."

In regard to the reduction of freight rates, this applies to ores of a value of $75 and upwards a ton and amounts to a reduction of $4 a ton. To cite a specific case: The former rate on ore valued at between $75 and $100 a ton from Smithers to Trail was $14 a ton. Under the new schedule the rate is $10 a ton. A similar reduction applies to other points in the district.

PLACER-MINING.

Cariboo and Quesnel Mining Divisions.—The outstanding feature of placer-mining was the successful operation of the Kafue Copper Development Company's dredge on Antler creek, near Barkerville. This fact has already been the means of focusing attention on the dredging possibilities of many other areas in the district.

The hydraulic properties were hampered by an unusually dry season. Of these, the larger properties were the *Lowhee*, operated by John Hopp, *Kitchener* mine on Keithley creek, and Cedar Creek Mining Company on Cedar creek. The Quesnel Gold Mining Company and Matthias Gold Mining Company, both operating on the North fork of the Quesnel river, after piping trial pits to test the ground, spent the major part of the season in constructing water systems to ensure abundance of water next year.

A large number of small operators were engaged at various points in the Cariboo and Quesnel Mining Divisions, their work centring in and about Barkerville, Stanley, Likely, Keithley, Quesnel Forks, Quesnel, and Cottonwood, Horsefly river, and country tributary to these points.

Some Keystone-drilling was done by J. G. McLaren in the Barkerville area by the Caribou-Quesnel Syndicate near Quesnel Forks and by J. M. Davidson on Keithley Creek delta on ground controlled by L. A. Bonner.

Omineca Division.—In the Manson section Robert H. Fleming was engaged in drilling the placer leases he controls on Manson creek.

A few men were engaged on Germansen river and Tom creek in small-scale hydraulic operations.

Early in July Hazelton was thrown into the throes of excitement by the news of a strike of placer gold on the Babine river about 5 miles east of the Indian village of Kisgagas, some 50 miles north of Hazelton. The discoverers were Messrs. Burke and Eck. A number of claims were staked, but comparatively few were recorded. The excitement subsided after a few weeks. The sample of gold shown the writer by one of the discoverers consisted of coarse flakes. E. Eck stated that the best he and his partner made in any one day was $5 each and that their average takings would be considerably less. He was of the opinion that, while prospects for larger-scale operations were good, wages could hardly be earned with a rocker. Time did not permit of the writer visiting the scene of the strike.

COAL.

Telkwa Collieries started up again in the early fall as usual. The market being limited in which this company on its present scale of working can compete, coal is mined only during the winter months. The output for the year was 1,581 long tons. It is very gratifying to record an increase of nearly 400 tons over last year's output. As a matter of fact, a much larger output would have resulted this year had not the unusually mild weather in the fall very much interfered with hauling the coal to Telkwa, the shipping-point.

PRODUCTION.

The following is a list of the shipping properties in District No. 2 and their outputs for the year 1925:—

Name.	Ore mined.	Gold.	Silver.	Copper.	Lead.	Zinc.
	Tons.	Oz.	Oz.	Lb.	Lb.	Lb.
Henderson	762	119	79,266	.....	197,426	.....
Silver Cup	50	.....	5,201	.....	24,793	.....
Victory	12	2	369	.....	5,391	.....
Mohawk	18	.....	1,052	.....	.....	.....
Totals	842	121	85,888	.....	227,610	.....

ROADS AND TRAILS.

Substantial aid to the mining industry was given during the year by the Mines Department in connection with assistance in building or repairing various roads and trails at many points in the district. The aggregate cost has been considerable; nevertheless, the beneficial effect of such a policy is being felt more and more each year, as the various sections of the district are thereby rendered more accessible.

NEW DISCOVERIES.

In mentioning the new strikes or discoveries of the year, it should be clearly understood that it is by no means intended to convey the impression that all such are likely to be of importance. They are of interest but their value remains to be proved. The strike of a seam of high-grade silver-lead ore, for example, in a region where such has hitherto not been met with, may create much local excitement. It may, however, prove subsequently to be unimportant. Nevertheless, it is always of value in so far as it indicates that search should be made for other and perhaps larger bodies of ore in the vicinity. A list of the more noteworthy strikes follows:—

Omineca Mining Division.—The *Silver Bow* and *Silver Cliff* groups staked by W. E. Vanmeter and near-by claims staked by Geo. Little on Kleanza mountain, above Vanarsdol; the *Banner Homestake* group, on the south side of Chimdemash creek; the *Calendar* group in Centre basin, Chimdemash creek; at *The Seven Sisters* group, Seven Sisters mountain; at the *Silver King*, Babine mountains; at the *Lakeview*, Grouse mountain; at the *Cornu Copia*, Grouse mountain; at the *Valhalla* and *Kleanza* groups, Kleanza mountain.

Cariboo Mining Division.—At the *Rainbow* group, Cow mountain, Barkerville; at the *Myrtle* group, Barkerville mountain; at the *Hudson* group, Pearce gulch, Cunningham creek, near Barkerville; at the *Homestake* group, Cunningham creek.

Quesnel Mining Division.—At Yank's peak, near Keithley, the discovery by Messrs. Talbot and Larsen was followed by the staking of many claims.

The foregoing are more particularly described in the body of this report. In one or two instances, mention of which will be made, time did not permit of an inspection.

PROSPECTING.

In the Annual Reports for the years 1917, 1921, and 1923 very full information is given as to the promising areas in this district for the prospector, and also a detailed account of the physiographic and geologic features of the district. These reports render it almost unnecessary to further enlarge upon the subject.

It seems well, however, to emphasize the fact that discoveries this year in areas adjacent to transportation show that such are not yet by any means thoroughly prospected. The prospector would do well to investigate these first before going farther afield.

To those who desire the more remote regions, the Manson section of the Omineca Mining Division offers a very large field, with both placer and lode possibilities.

Recent discoveries in the Cariboo and Quesnel Mining Divisions clearly indicate that there is a field there for the prospector for lode minerals. The uncanny thoroughness with which the old-timers went over this ground in the early days naturally minimizes the likelihood of the present-day prospector finding any very *rich* placer deposits in *places where they might ordinarily be expected*. The modern discovery at Cedar creek indicates the advisability of searching for "high runs" in the Quesnel Lake section. In connection with low-grade gravel-deposits there are still many opportunities.

Prospectors are strongly advised not to devote too much time to slender showings of lode mineral in inaccessible regions. It is also suggested that they would be well advised to look for the contacts of the igneous rocks with the sedimentaries or volcanics first, and then search the more immediate vicinity for ore-bearing veins. The latter may be either in the igneous or the sedimentary rock. Contacts are usually much easier to find than veins. A very favourable place is frequently where an injection tongue from the igneous rock contacts with the sedimentary or volcanic.

OPPORTUNITIES FOR CAPITAL.

The attention of field engineers and any others interested is particularly drawn to the fact that there exist in the North-eastern District many promising prospects, of which descriptions

may be found in the Annual Reports. There are good mineral-showings containing values in gold, silver, lead, zinc, and copper; also occurrences of tungsten, arsenic, cobalt, molybdenite, and mica. Some of these are ideally situated so far as transportation is concerned, likewise as to general mining facilities. Many, although situated some miles from railway points, nevertheless offer no serious objection on the score of transportation and are free from any purely mining problems connected with extraction. Generally speaking, they should appeal to the operating engineer as being worth a little preliminary development.

Undoubtedly there are many opportunities for large-scale placer-mining. There are also many placer properties of the smaller kind, the owners of which have not the means to get water on their ground for the purpose of sluicing or piping; for example, prospects on the North fork of the Quesnel river, or others somewhat similarly situated. There appears to be no reason why a campaign with a mobile, oil-engine-operated pumping plant should not meet with success. Such a plant could be readily moved from one prospect to another and the outlay involved would not be great.

It is frequently said that the prospector-owner is a hard man to make terms with. That may be true in a few instances, but, generally speaking, the prospector-owner is in most cases far from unreasonable. If he does not yet fully realize the gap which has to be bridged between the prospect and the profit-earning mine and the difficulties and expense involved, nevertheless he is to a very large extent prepared to meet capital half-way. To cite a specific instance: There is at the present time in the Quesnel Mining Division a body of prospector-owners of certain placer properties who announce their willingness to furnish the labour necessary for testing by Keystone drill and to concede not less than a 40-per-cent. interest if interested capital will provide funds necessary for equipment when the properties have been proved. In this connection it is to be noted that it is possible to borrow from the Department of Mines a Keystone drill on providing the necessary bond for safe custody. Consequently, under the conditions mentioned, very little expense is involved in the preliminary drilling. If the latter is unfavourable, that ends the matter. If the result of drilling is favourable, no expenditure is required on account of purchase price, but merely that involved in equipment. The order of magnitude of the latter would of course be apparent before preliminary drilling was commenced. Under certain conditions a strict "fifty-fifty" sharing basis might be agreed to. Confident expression is given to the view that interested capital will find the prospector-owner, in all parts of the district, generally speaking, entirely reasonable and willing to give most careful consideration to any counter-views.

It is also to be pointed out that coal occurs at several points, all of which are listed in the Annual Report for 1924. One colliery, Telkwa Collieries, Limited, maintains a small but increasing output. The other coalfields are as yet undeveloped.

Those interested in the district can always obtain from the Resident Engineer the fullest information concerning the details of any matter connected with mining which it is within his power to furnish.

Note to Prospectors.—It is an opportune time to remark that much misapprehension exists as to the value of lead ores. It is apparently imagined that the price of lead which so freely circulates in the course of ordinary conversation—for example, "9-cent lead"—is the rate at which lead is paid for. In this country lead-smelting rates are based on *London* lead quotations, which are lower than the New York quotations so commonly employed in conversation. Further, the marketing and refining charge of 1¼ cents a pound is deducted from the London quotation converted into dollars and cents. At the time of writing, for example, New York lead is quoted at 9.1 cents a pound; London quotation being 7⅔ cents, so that lead would be paid for at the rate of 7⅞ less 1¼, or, say, 6.4 cents a pound.

Further, it is supposed that zinc in an ore which is essentially a *lead* ore is paid for. It is not; it is penalized. On the other hand, a bonus is allowed for silica and lime contents. If any prospector wishes to have the values shown in percentages and ounces to the ton, on an assay certificate, translated into dollars and cents, the Resident Engineer will gladly do so on being communicated with.

The writer desires to express his sincere thanks to the prospectors, operators, and mining men of the district for the many courtesies extended.

MOUNTAIN NOMENCLATURE.

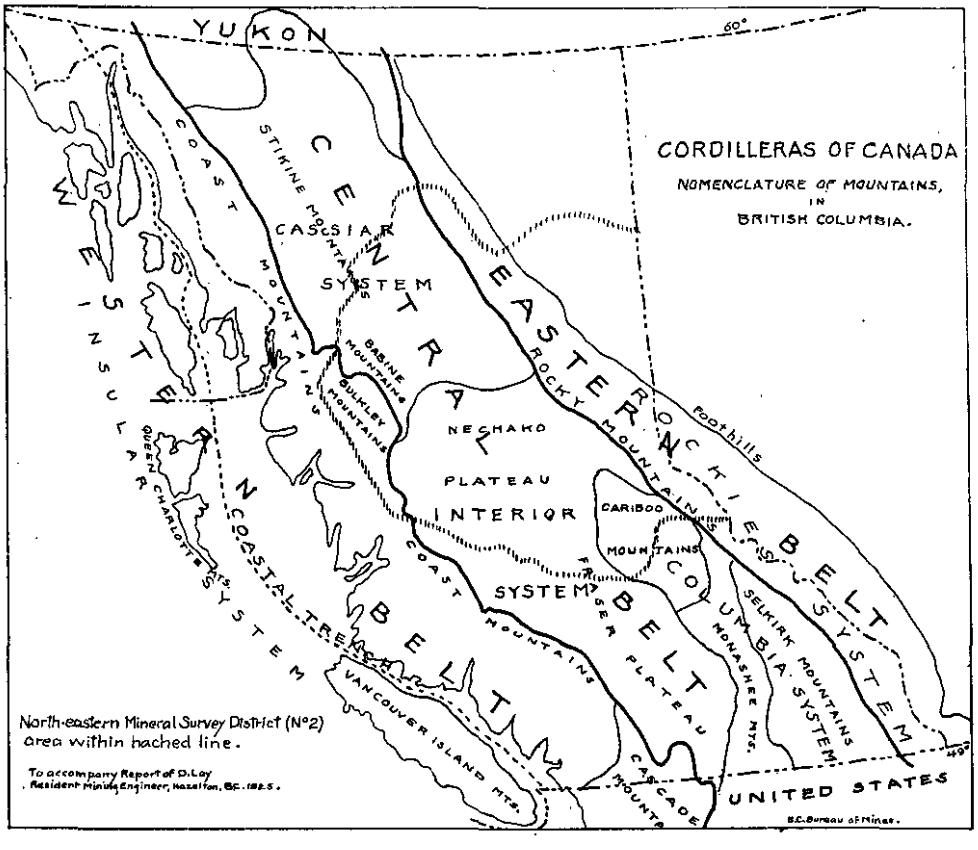
It may be well to point out that the nomenclature used in these reports is that approved by the Geographic Board of Canada. The statement on the subject published by the Board, dated April 2nd, 1918, may be obtained by applying to the Geographic Board, Ottawa. A map illustrative of the scheme of classification in so far as it concerns British Columbia appears in this report. The table published by the Geographic Board, accompanying the statement referred to, appears in the Annual Report of the Minister of Mines for 1917. Attention is directed to the report therein on the North-eastern District by John D. Galloway, which contains much supplemental geographic and geologic information.

OMINECA MINING DIVISION.

SKEENA SECTION.

Vanarsdol.

Considerable local excitement was caused during the latter part of the season by the discovery by W. E. Vanmeter of high-grade galena on Kleanza mountain within 2 miles of Vanarsdol, a small settlement on the Canadian National Railway 5 miles east of Terrace.



Following upon this a number of claims were staked in the vicinity, mainly by Geo. Little, but time only permitted of inspection of those staked by W. E. Vanmeter.

Silver Cliff and Silver Bow.

Each group consists of three claims and the groups adjoin. They are situated on Kleanza mountain and overlook the Skeena river at a point about 1 mile above Vanarsdol, at an elevation of about 2,000 feet. They are owned by W. E. Vanmeter and associates and occur in the immediate vicinity of the contact of the Coast granodiorite with volcanic rocks, the veins occurring in the volcanics. Specimens of the latter sent to the Provincial Mineralogist have been determined as: "Fine-

grained altered rock, apparently of volcanic origin, and of andesitic composition, schistose structure. Some secondary calcite and much chlorite developed." Some specimens effervesce very briskly in hydrochloric acid, simulating, in this respect, limestone.

On the *Silver Cliff* group the only mineral observed was a small stringer of galena and blende in the volcanic country-rock above referred to, striking N. 45° W. (mag.) and dipping north-easterly at 65°. A sample of this stringer assayed: Gold, 0.10 oz.; silver, 21 oz. to the ton; lead, 26 per cent.; zinc, 8 per cent. The elevation at this point is 1,850 feet.

On the *Silver Bow* group at an elevation of 2,200 feet there is exposed by an open-cut in the steep hillside a small quartz vein, striking N. 35° W. (mag.) and dipping at a flat angle in a north-easterly direction. The open-cut showed a very marked tendency of the ore to widen, and in the bottom there was a width of 10 inches of solid galena and blende. A sample representative of this width assayed: Gold, 0.20 oz.; silver, 84 oz. to the ton; lead, 50 per cent.; zinc, 24 per cent.

The topography not permitting of drifting without considerable crosscutting first, the owner was advised by the writer to sink on the showing, carefully saving and shipping the resulting ore. By sinking along the foot-wall first and taking the ore left in the back down afterwards—"stripping" it, in other words—a good saving can be made. A pile of about a ton of nice clean-looking ore resulted from the preliminary open-cut.

W. E. Vanmeter decided to at once construct a pack-trail from the Skeena river to the *Silver Bow*, on which a cabin was nearly finished at the time of inspection, and to commence mining and packing the ore down to the railway across the Skeena. An immediate grant towards this trail was made by the Department of Mines and the trail is now completed. The owner proposes to carry on mining during the winter. The vein occurs in the volcanic rock previously referred to, but granodiorite outcrops a short distance lower down the hill and also as an igneous tongue close to the vein.

A favourable geological region, nearness to transportation, and low elevation are all factors which should stimulate active search in this vicinity for surface evidence of other and possibly larger bodies of similar ore. The owners are strongly advised to prospect the surface of their properties thoroughly. It is suggested that probably search will be expedited by looking for contacts of igneous rock with the volcanics first and then making a closer search in the vicinity of the contacts for veins. Veins may occur in either igneous or volcanic rock.

Usk.

Small-scale operations were carried on at several properties in the immediate vicinity of Usk.

Lucky Luke. This property, owned by L. E. Moody and R. Lowrie, is very well situated, being only about 1½ miles distant from Usk and the lowest workings being only a little over 500 feet above the Canadian National Railway track, from which an excellent trail leads to the property. Briefly, the workings consist of two tunnels approximately 55 feet vertically apart, connected by a raise. A very nice showing of ore exists in the vicinity of the raise, consisting of a width of 12 inches of solid copper mineral, mainly bornite, with lesser amounts of chalcopyrite and pyrite, with a more scattered mineralization, not fully exposed, in both foot and hanging walls at a point immediately above the lower tunnel. It is reported that in the latter nice ore was continuous for a length of about 90 feet. At the end of this working the ore was abruptly terminated by a fault. However, no great difficulty may be experienced in again picking up the vein.

In 1924 25 tons of ore was shipped, smelter returns from which gave assays of: Copper, 22.5 per cent.; silver, 12.7 oz.; gold, 0.73 oz. to the ton. The ore available for stoping may be expected to assay much the same as the foregoing. It was the hope of the owners to ship about 30 tons during 1925, but owing to illness of L. E. Moody only a few tons was mined.

Cordillera Group. This property, owned by the Kitselas Mountain Copper Company, adjoins the *Lucky Luke* on the east. This company hopes to be able to raise funds for further development in the near future. A very large amount of crosscutting has been accomplished by this company in relation to actual development within the vein system. Such a policy has been dictated by various causes, but unfortunately this large expenditure on dead-work has depleted the funds available for attack at more promising points. The property is ideally situated so far as transportation is concerned, the lowest workings being practically on the railway-track.

The *Marcena* group adjoins the *Cordillera* on the east and is reported to have a promising showing of mineral. The vein on it is regarded as being the continuation of part of the *Cordillera* system.

The characteristic of all the above-mentioned properties is values in free gold in the prevailing copper mineralization.

Diadem Group. This group, situated 2½ miles east of Usk and at a low elevation, is ideally situated so far as transportation facilities are concerned. It is reported by the owner to have been bonded this fall and development in the spring of 1926 is anticipated. A full description of it is given in the 1923 Annual Report.

Lucky Jim. This property, owned by Fred Forrest, is situated on Kleanza creek, about 13½ miles from Usk. The owner was working on it himself during the season and reports that it is looking very well. It is known to be of promise. (*See* 1923 Annual Report.)

Valhalla and Kleanza Groups. These groups, situated on Kleanza mountain, adjoin, and together cover an area of about 720 acres. They are distant from Usk about 3 miles by wagon-road. Under the supervision of J. Wilman, of Usk, small-scale development-work was carried on during the year, which was successful in the discovery of two new veins, respectively 1½ and 4 feet in width, both of which showed distinctly promising values in gold. Unfortunately time did not permit of the writer inspecting this property this year. He passed along its base, however, and was much impressed with the very favourable conditions surrounding the property as to nearness to railway, topography entirely conducive to cheap mining, abundance of water-power, and timber. Moreover, it cannot be questioned that the surrounding geological conditions are favourable.

W. J. Elmendorf, of Seattle, Wash., examined this property in 1924 and again this year; excerpts from his reports are as follows:—

"*Valhalla and Kleanza Groups.*

"*Claims.*—The Skeena Lumber Company is the owner of these groups, which consist of the following claims: *Valhalla, Valhalla No. 1, Valhalla No. 2, Valhalla No. 3, Valhalla No. 4, Valhalla No. 5, Valhalla No. 6, Valhalla No. 7,* comprising the *Valhalla* group, also *Tomboy, Vindicator, Tenderfoot, Dakota, Vimy, Ballarat, L.C. Fraction, Norman Fraction,* comprising the *Kleanza* group.

"*Location.*—The properties are near the town of Usk, a station on the Canadian National Railway about 100 miles east of Prince Rupert. A good wagon-road extends from Usk to within a short distance of the lower end of the *Valhalla* group. This road is about 2½ miles in length. A direct route to the railway would be from the property to a point across the Skeena river near the site of the old town of Kitsalas. This is little more than 1½ miles. All the claims are on or at the base of Kleanza mountain. The claims extend from an altitude of 500 feet at the lower end of the *Valhalla No. 4* to 5,000 feet above sea-level at the upper end of *Valhalla No. 6.* The property is well located. If the transportation question becomes an important one in the future there are few problems to solve. The topography of the mountain on which the claims are situated is not unduly steep or rough. All development can be done for many years without the necessity of sinking as a principal means of working the veins. It is hard to imagine a more ideal condition for economical underground work. A tunnel from *Valhalla No. 4* would be 4,500 feet deep by the time it reached the southern boundary of the group.

"Timber for mining purposes is everywhere abundant on the claims. Water-power can be—in fact, already has been—improved for all future requirements at a minimum expense. The rock is not unduly hard and drifting should be done cheaply. These are important considerations in the contemplated working of a mine and must not be minimized.

"*Geology.*—The *Valhalla* and *Kleanza* groups cover an area in the typical coastal greenstone-granodiorite formation of British Columbia. The boundary of the coastal granite batholith is but a short distance to the west and the granodiorite itself is cut in many directions by intrusive dyke-rocks varying from the most acidic to ultra-basic in composition. These are of many ages, both before and after the formation of the veins and their mineralization.

"In such an area it is inevitable that regional metamorphism should be apparent. Fissuring and faulting is seen in every direction and combine to make the region one of peculiar adaptability to the formation of ore-bearing veins.

"*Veins.*—There are at least four well-defined quartz fissure-veins on the *Valhalla* group. These have approximately the same strike, north-west and south-east and dip to the east at from 55° to 65° from the horizontal. They have been numbered 1, 2, 3, and 4 from west to east and will be described by these numbers.

"*Vein No. 1.*—This vein has been traced through *Valhalla No. 2* claim, through *Valhalla No. 1* into *Valhalla*, and probably shows again in *Valhalla No. 6*, a distance of nearly 1½ miles. The vein is from 2 to 5 feet wide and mineralized with pyrite and chalcopyrite. It carries small amounts of gold everywhere and in many places free gold may be seen.

"*Vein No. 2.*—This has been traced from the middle of *Valhalla No. 3* to the middle of *Valhalla No. 2* and probably appears again in Valhalla creek on the upper end of *Valhalla No. 1*, a total length of 3,000 feet. Open-cuts on the vein show from 3 to 4½ feet in width of good-looking though sparsely mineralized quartz.

"*Vein No. 3.*—This is the most important vein on the *Valhalla* group and the one on which most work has been done. It has been traced and opened from the south corner of the *Tenderfoot* claim through *Valhalla No. 3* and into *Valhalla No. 2*. It may show in Valhalla creek also, a distance of nearly 4,000 feet. There are two tunnels and two principal open-cuts on this vein. The upper tunnel, known as the *Dakota* tunnel, is on the upper end of *Valhalla No. 3* and is 60 feet in length. The vein is from 4 to 5 feet in width. The lower tunnel on the No. 3 vein is 105 feet in length and the vein shows from 2 to 4 feet in width.

"*Vein No. 4.*—This vein is opened by four cuts and extends from the *Tenderfoot* claim through the *Norman Fraction* to the line of *Valhalla No. 2*, a distance of about 2,000 feet. The vein in places shows some galena and the quartz is of a very good character for gold mineralization. It is from 2 to 4 feet in width.

"Two new veins have been located on the surface of *Valhalla No. 2* since my visit last year:—

"*Valhalla No. 2—Small New Vein.*—This vein lies above vein No. 1 and between it and vein No. 2. Where opened it shows about 1½ feet in width of quartz mineralized with pyrite and some chalcopyrite. This vein has been traced for about 500 feet along its strike. As is the case with all of the other veins of this series, it strikes north-west and dips to the north-east. A selected sample taken from the outcrop assayed: Gold, 2.3 oz.; silver, 8.9 oz. to the ton.

"*Valhalla No. 2—Big New Vein.*—This vein lies above the last one described and between it and the vein No. 2. It shows 4 feet of well-mineralized quartz where opened. A selected sample from this showing assayed: Gold, 1.2 oz.; silver, 3.4 oz. to the ton. Both these veins conform to the others of the series in strike, dip, and general appearance, and emphasize the importance as well as the advisability of further development in this really promising area.

"*Opinion.*—My favourable opinion of these properties has been greatly strengthened by my latest visit to them. The work done since last year has all been satisfactory and the showings at this time fully warrant a careful campaign of serious development for the future operation of the mines. The *Tenderfoot* tunnel should be driven ahead on the No. 3 vein, and when it has been advanced about 200 feet crosscutting to the No. 4 and possibly to the No. 5 vein should be done. The time is not far distant when a plant of machinery consisting of compressor and air-drills should be installed, and such an installation should be contemplated in connection with any future operations."

Chimdemash Creek.

By means of a grant from the Mines Development Fund the trail from Usk to Silver basin, at the head of Chimdemash creek, was completed during the summer. This trail is approximately 14 miles in length and affords ready access to the properties in Silver basin. The town of Usk is approximately 300 feet above sea-level and the elevation of the end of the trail in Silver basin is 3,800 feet above sea-level.

Silver Basin and Silver Crown Groups.—The owner, J. D. Wells, carried on small-scale operations during the year on these groups, which were fully described in the Annual Report for 1924, since when no material change has taken place.

Coffee Pot Group. This group, consisting of eight claims situated on the north side of Silver basin and owned by A. Stewart and partners, was the scene of a recent strike of mineral. At an elevation of about 5,150 feet two more or less parallel fractures of an average width of about 1 foot in the volcanic rock show a promising mineralization. One fracture shows some nice stringers of solid bornite and the other galena, chalcopyrite,

and specular iron. Copper-stains are also much in evidence. Unfortunately precious-metal values were somewhat low in samples taken. A sample of the bornite assayed: Gold, trace; silver, 7 oz. to the ton; copper, 25 per cent. A sample of seam showing galena assayed: Gold, trace; silver, 5 oz. to the ton; copper, 11.7 per cent.; lead, 9 per cent.

Banner Homestake Group.

This group, consisting of five claims, is situated on the south side of Chimdemash creek, about 3 miles south-west of Silver basin. The owners are L. E. Moody and G. T. Mills, who discovered in 1925 the showing described below. At an elevation of 4,150 feet a fracture in the volcanic breccia country-rock, striking about N. 65° E. (mag.) and dipping southerly, shows a heavy copper-stain over a width of about 20 feet. About 100 feet in a north-westerly direction a quartz-porphyry dyke outcrops and appears to be striking at right angles to this mineralization. A small amount of galena was noted and a little chalcopyrite, but the mineralization consists mainly of malachite. A sample taken of picked pieces over the width of 20 feet, with a view to ascertaining the grade in precious metals, assayed: Gold, trace; silver, 1 oz. to the ton; copper, 3.9 per cent. There are said by the owners to be other good exposures on this property, but neither of the owners was present at the time inspection was made and these were not seen. It is unfortunate that silver values are not higher.

Calendar Group.

This group, owned by B. Shannon and S. A. D. Davis, is situated in Centre basin, which is at the head of the Centre fork of Chimdemash creek. There is no trail at present to this basin and it has apparently not been prospected to any extent. The owners report the discovery of galena showing grey copper, but an inspection was not possible.

Examining engineers and others interested should note that the town of Usk, on the Canadian National Railway (about 100 miles east of Prince Rupert), is the centre from which all the above-mentioned properties can be rapidly and easily reached.

Legate Creek.

The town of Pacific, a divisional point on the Canadian National Railway some 13 miles east of Usk, is the point from which all properties situated on Legate creek may be readily reached.

The Skeena river is crossed at Pacific by ferry, and from the ferry-landing on the east side of the river an excellent pack-trail 12 miles in length leads to "Brown's Cabin" at the head of Legate creek, at an elevation of 1,700 feet. As the elevation of Pacific is somewhat under 400 feet, the grade of this trail is therefore excellent, rising at the rate of but little more than 100 feet a mile.

"Brown's Cabin" forms an excellent stopping-place, from which convenient short trips may be made to the various properties in the vicinity. The hospitality of the owner, J. Brown, is freely extended to all. The chief properties are the following:—

M. & K. Group.

This group, owned by M. Orr and partners, is situated on the north side of the East fork of Legate creek. What promises to be a discovery of importance is known as the "Lower Showings." The "Upper Showings" comprise the older portion of the property, which has been fully described in the Annual Reports for the years 1916, 1917, and 1919, since when no noteworthy development has taken place.

The "Upper Showings" are in volcanics, but the "Lower Showings" are in diorite, at an elevation of 3,475 feet. At this point three open-cuts expose a well-mineralized fissure in diorite, the latter rock being bleached on the hanging-wall side near the vein. The present open-cuts prove a length of about 100 feet, but a much greater extension is to be expected. The strike of the fissure is N. 15° W. (mag.) and the dip is westerly at about 50° to 55°. The centre open-cut shows a width of 3 feet, well mineralized with galena, chalcopyrite, a little grey copper, and some specular iron. A sample across a width of 10 inches, this being the best portion of the fissure, assayed: Gold, 0.10 oz.; silver, 39 oz. to the ton; copper, 0.8 per cent. A sample of the most heavily mineralized pieces to be found assayed: Gold, 0.20 oz.; silver, 28 oz. to the ton; copper, 0.7 per cent.; lead, 22.5 per cent.; zinc, 11 per cent.

On the south side of the East fork is a large mass of diorite, which is quite likely continuous between the *M. & M.*, situated therein, and the "Lower Showings" of the *M. & K.* The present exposure on the latter is well worth following up and other similar fissures should be looked for



Silver King Mine, Omineca M.D.



Henderson Mine, Omineca M.D.

in the diorite. Such, involving no difficult mining problems, should appeal to the operating engineer.

M. & M. Group. This group is situated on the south side of the East fork and is owned by Roy Moore. Three very clearly defined fissures in the diorite country-rock, striking approximately N. 70° W. (mag.) and dipping south at 55° to 66°, can be traced for long distances on the surface, extending in an easterly direction from the points of exposure. The most northerly can be traced for about 3,000 feet. These parallel fissures are close together, the maximum distance between any two not exceeding about 75 feet. The width of the most northerly is about 5 feet, that of the middle fissure somewhat greater, while at one point the most southerly fissure is 20 feet in width. A rhyolite sill is in evidence on this property and to the south the formation is andesite. Both *M. & K.* and *M. & M.* groups are of course evidences of the favourable effect on mineralization of contacts of the igneous with the volcanic or sedimentary rocks. The two most southerly fissures are exposed along their dip by the natural agencies which have formed the Main Creek gulch. At various points along their strike and dip exposures show good mineralization.

Prospecting has been practically entirely confined to the most northerly fissure, which has been stripped on the surface for a considerable distance, showing good mineralization, consisting mainly of galena, grey copper, and malachite. Native silver was also noted at one point. The elevation of this exposure is 4,700 feet. The fissures show bands of quartz containing the minerals mentioned, the remainder of the filling being altered diorite. This is characteristic of all the diorite-fissures inspected in the district. A selected sample assayed: Gold, 0.04 oz.; silver, 191 oz. to the ton; copper, 1 per cent.; lead, 3.5 per cent.

This prospect presents a combination of high silver values, absence of mining problems connected with extraction, and favourable topography, which should appeal to field engineers, to whose inspection it is commended.

Independence Group. This group is situated at the head of the Main fork and is owned by J. Burns. A well-defined shear-zone in andesite is exposed by various open-cuts. Mineralization consists of small amounts of copper minerals, including grey copper. At an elevation of 4,950 feet a drift has been run on the fissure for a short distance. The face is, however, not very well mineralized. Development has hitherto been purely superficial, with the exception of the one drift mentioned, but samples taken from surface exposures have disclosed good silver values and the fissure is a strong one. The strike is N. 50° W. (mag.) and the dip is to the west at a steep angle. An excellent trail some 3 miles in length leads to the property from "Brown's Cabin."

Hidden Group. This group, also owned by J. Burns, is situated in the centre of the Main Fork basin at an elevation of about 3,700 feet. This is a fissure in diorite, very similar to those of the *M. & M.* group. It is exposed at two points about 1,000 feet apart. At one point the vein is stripped for a length of about 150 feet. Mineralization appears to be confined to a seam of quartz on the hanging-wall about 6 inches in width, which is well mineralized with grey copper, galena, and zinc-blende; copper-stains are also in evidence. This fissure is several feet in width and the general appearance is hopeful and warrants further investigation.

The *Regina* and *Cabin* groups are also situated on the Main fork, but time did not permit of an inspection. The owners, J. Brown and partners, carried out the usual assessment-work.

Imperial Group. This group, owned by J. Brown, M. Orr, and associates, is situated on a tributary of the South fork. At an elevation of 2,700 feet, in the immediate vicinity of a contact between three different kinds of country-rock—namely, rhyolite, volcanic breccia, and diorite—there occurs a heavy mineralization of specular hæmatite and copper pyrites 6 feet in width. This mineralization appears to follow the line of the rhyolite-breccia contact and is distant from the latter about 125 feet in an easterly direction. The exposure is by means of an open-cut, below which is a short crosscut tunnel in the breccia about 25 feet in length. Obviously, work should be confined to following the mineralization itself. A sample taken across the full width of 6 feet assayed: Gold, trace; silver, 0.4 oz. to the ton; copper, 3.5 per cent.

White Bear and South Fork.—W. L. Jordan and J. R. Smith are the owners of these silver-lead claims, which are situated at the head of the South fork.

Grey Copper.—This claim is situated between the Main and South forks and is also owned by Messrs. Jordan and Smith. Time did not permit of an inspection of the last-mentioned three properties.

Frisco Creek.

Frisco Group. This group of three claims is owned by M. Orr. It is situated at the head of Frisco creek, a tributary of Legate creek, flowing into the latter from the north at a point about 1½ miles below "Brown's Cabin." The owner did annual assessment-work during the year, but it was not possible for the writer to inspect the group.

Seven Sisters Mountain.

Cedarvale, a small settlement on the Canadian National Railway about 40 miles west of Hazelton, is the point from which a trail leads from the ferry landing-stage on the east side of the Skeena river up Seven Sisters mountain. The elevation of Cedarvale is 500 feet above sea-level.

Seven Sisters Group. This group, consisting of six claims and owned by Steve Young, is situated above timber-line at an elevation of 4,850 feet. No opportunity of inspecting this group having presented itself earlier in the season, an effort was made to do so in the middle of November, when snow was absent from the base of the mountain. The group is distant at least 8 miles from Cedarvale and the objective was reached after a somewhat severe trip, there being at least 3 feet of snow in the vicinity of the group. After the snow was shovelled off the open-cuts, where work had been progressing, a very promising mineralization was disclosed, showing some nice clean galena with pyrite, zinc-blende, and pyrrhotite. The snow conditions were such that it was quite impossible to form even an approximate idea of widths, but the fact that the galena proved of very excellent grade in silver, coupled with the favourable accompanying mineralization, strongly indicates the advisability of further work. Obviously, if there is any material amount of galena, such could readily be hand-sorted and packed down to the railway at a profit. There being a depth of some 3 feet of snow, it was consequently not possible to inspect the country-rock near the exposure. The rock in immediate contact with the mineralization was found to be an igneous dyke. Sedimentary rocks compose the country-rock of Seven Sisters mountain as a whole. These have been classified by the Geological Survey, Canada, as belonging to the Hazelton group.

Very little work has been done on this mountain, but the existence of ore of the type exposed at the *Seven Sisters* group, coupled with the adjacent railway transportation, are facts which warrant its close investigation.

Sample of picked galena from the *Seven Sisters* group assayed: Gold, 0.02 oz.; silver, 226 oz. to the ton; lead, 64 per cent.; zinc, 6 per cent. A sample consisting mainly of zinc-blende and pyrrhotite assayed: Gold, trace; silver, 4 oz. to the ton; lead, *nil;* zinc, 20 per cent.

Hughie. This claim, owned by M. Orr and C. Whitmore, is situated on Seven Sisters mountain, about 3 miles from Cedarvale. At an elevation of 1,850 feet there is exposed in the dark-coloured quartzite country-rock a vein striking N. 10° W. (mag.) with a steep westerly dip. This is stripped on the surface over a length of about 30 feet and at one point a shaft has been sunk to a depth of a few feet. A width of 3 feet is fairly well mineralized with galena, zinc-blende, and copper-stains in the filling, which consists of quartz and altered country-rock. A seam 4 inches in width was composed largely of galena and zinc-blende, and a sample of this assayed: Gold, trace; silver, 9 oz. to the ton; lead, 24 per cent.; zinc, 27 per cent. Some surface prospecting would be advisable to locate any possible igneous intrusions and a possible better mineralization in the vicinity of such. This exposure is situated close to the trail which leads on up to the *Seven Sisters* group.

Belle Vue Group. This group, it is to be noted, is not situated on Seven Sisters mountain, but on the west side of the Skeena river. It consists of three claims owned by B. Wright and partners and lies about 3 miles to the north-west of Cedarvale, at an elevation of some 1,500 feet overlooking the Skeena river; hence the name. At this point a number of quartz veins varying in width from 1 to 4 feet occur in the quartzite formation. Some have a strike of N. 15° W. (mag.) with steep westerly dip. At one point on a steeply sloping hillside one vein showed stains of copper over a width of 4 feet. A sample taken at this point failed, however, to disclose any values. At a point higher up the hillside at an elevation

of 2,000 feet another set of veins striking N. 55° E. (mag.) occur with larger intersecting quartz veins, but no mineralization was noticeable.

Laddie Group. This property consists of two claims owned by J. Lamont and is distant about 1 mile east of Kitwanga, an Indian village on the Canadian National Railway. The claims are situated on the north side of the Skeena river at an elevation of 975 feet, just 400 feet above the railway-track, from which they are not more than a few hundred yards distant. The quartzite country-rock at this point strikes about N. 20° W. (mag.) and the bedding dips westerly at an angle of about 65°. A replacement zone a few feet in width and conforming to the strike and dip of the quartzites shows a somewhat sparse mineralization of mainly zinc-blende with very small amounts of galena and slight copper-stains. The filling is altered country-rock. Exposure is by means of shallow open-cuts. While mineralization is in the main somewhat sparse, nevertheless at certain points it is much heavier than at first sight appears, as some pieces of what at first sight appear to be altered quartzite consist largely of zinc-blende. A sample of one such piece assayed: Gold, trace; silver, 2.6 oz. to the ton; lead, *nil;* zinc, 44.5 per cent.

In view of this, and of the fact that the claims are so readily accessible, the owner would be well advised to do some more work at some of the existing shallow open-cuts.

Wilson Group. This group, consisting of three claims, is situated within a short distance of Woodcock, a few miles east of Cedarvale. The owner, A. S. Gray, reports that he has a good showing of chalcopyrite. Time did not permit of an inspection by the writer.

Fiddler Creek.

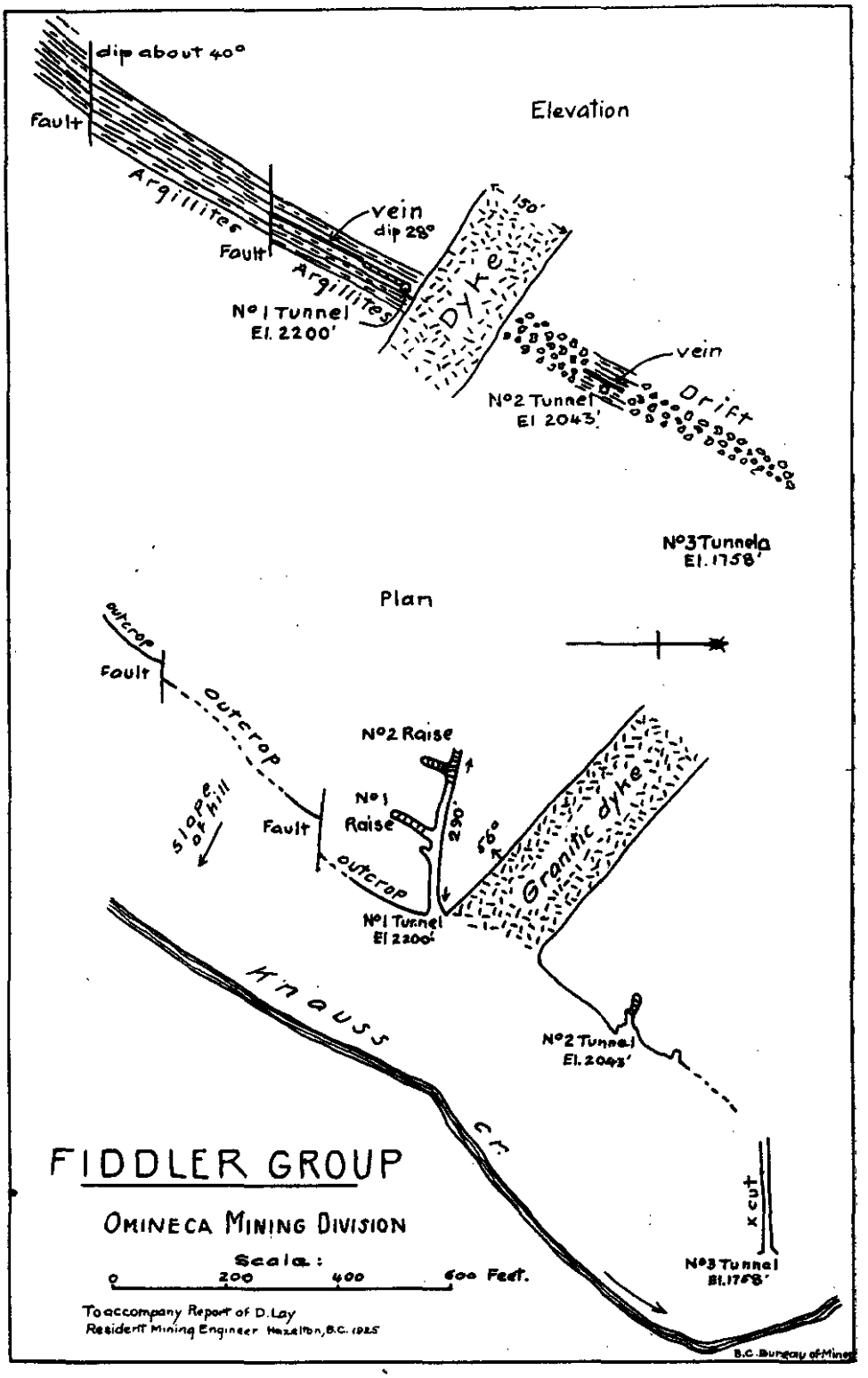
Fiddler Group. This group is situated on Knauss creek, a tributary of Fiddler creek, and is distant 4½ miles by wagon-road from Dorreen, a station on the Canadian National Railway 125 miles east of Prince Rupert. Towards the end of July development-work was resumed with a force of twelve men in all. A footage of 250 feet of development was carried out until the beginning of November, when operations were discontinued, for the time being at any rate.

In the Annual Report for 1916 will be found a very complete description of this property. The descriptive information to be found therein will not be repeated in this report. The property is also mentioned in the 1924 and other Annual Reports. Perusal of this report will also be facilitated by reference to the accompanying map.

Development comprises the following: No. 1 level was advanced westerly 58.5 feet; No. 1 raise was advanced 95 feet; No. 2 raise, 61 feet. In addition, 26 feet of drifting took place on No. 2 level and a small additional amount of prospect raising, bringing the total to 250 feet of development.

On No. 1 level the results of the development were, in the case of all faces under attack, that both vein and mineralization therein narrowed *as the distance from the large igneous injection tongue increased.* Further, the persistence of gold values in the narrowing mineralization was quite remarkable. These facts very clearly indicate the advisability of sinking at one or two places and following downward the good ore which exists in the floor of No. 1 level, this ore constituting the second ore-shoot on this level previously referred to. It seems highly likely that very good ore will be found in the more immediate vicinity of the large dyke and on the upper side of it. Any tentative stoping operations in this region (which are always of value in guiding development) must be by underhand-stoping methods, in view of the large igneous mass which lies between No. 2 and No. 1 levels. Further driving on No. 1 level appears to be distinctly in the nature of exploration rather than development, inasmuch as it must be entirely a matter of conjecture how far this level will have to be driven to penetrate an ore-shoot uninfluenced by the igneous tongue which appears to be the main causative influence in connection with the ore-shoots encountered at more easterly points on this level.

As to No. 2 level, a small amount of tentative driving was carried on here quite insufficient to draw any conclusion therefrom, save that in this region, too, values persist remarkably in a very narrow width. Referring to the map, it will be seen that this level would require, as far as it is possible to form an idea of the exact distance, to be driven in the neighbourhood of 600 feet, or thereabouts, in order to just emerge from the large dyke in the promising region below No. 1 level. While it is a mistake to infer that no profitable ore will be found on this level until


dip about 40°
Fault
Elevation
Argillites
vein
dip 28°
150'
Fault
Argillites
DYKE
No 1 Tunnel
El. 2200'
vein
Drift
No 2 Tunnel
El 2043'
No 3 Tunnel
El. 1758'
Plan
outcrop
Fault
outcrop
No 2 Raise
No 1
Raise
290'
slope of Hill
Fault
outcrop
56°
Granitic dyke
No 1 Tunnel
El 2200'
KNAUSS
No 2 Tunnel
El. 2043'
FIDDLER GROUP
OMINECA MINING DIVISION
Scale:
0 200 400 600 Feet.
x cut
No 3 Tunnel
El. 1758'
To accompany Report of D. Lay
Resident Mining Engineer Hazelton, B.C. 1925
B.C. Bureau of Mines

the region mentioned has been reached by it, nevertheless any development on this level should clearly be preceded by the sinking on No. 1 level previously mentioned.

This property has a good showing of ore above No. 1 level available for attack at any time (*see* assay table), and also a good exposure in the floor, which may be attacked by underhand-stoping methods until justification has been afforded for driving No. 2 level ahead. Further, the nearness of the property to transportation, abundance of mine-timber, adequate water-power which may be rendered available, and favourable geological conditions combine to make the property attractive.

A number of samples were taken by the management during the progress of development, of which the following are averages:—

Working.	Width.	Gold.	Silver.	Lead.	Zinc.
West drift, No. 1 level—	Inches.	Oz.	Oz.	Per Cent.	Per Cent.
Between points 42 and 232 feet west of portal.....	13	0.86	2.0	2.0	1.9
Between points 232 and 290 feet west of portal....	6	0.72	1.1	0.9	1.4
No. 1 raise, No. 1 level, 95 feet of advance.....	7½	0.97	1.8	1.0	2.8
No. 2 raise, No. 1 level, 61 feet of advance.....	4½	1.14	1.2	1.0	2.3
Stope by portal of No. 1 level, length 20 feet.....	18	2.00	4.0	Trace	5.0

Payne Group. This group is situated on the east side of Fiddler creek considerably below the *Fiddler* group. Several open-cuts on the lower side of the *Fiddler* group wagon-road disclose a mineralized steeply dipping vein, striking about N. 20° E. (mag.). Insufficient work at the points examined prevents an accurate idea of vein-width, undergrowth of vegetation being dense. Mineralization at one point was very similar to that of the *Fiddler* group. A sample taken across 6 inches assayed: Gold, 0.03 oz.; silver, 7 oz. to the ton; copper, trace; lead, 1 per cent.; zinc, 3 per cent. The topography is very favourable for development and the owners would appear to be well advised to do some additional work at one or two points. The names of the owners could not be ascertained, but apparently are not local residents.

HAZELTON SECTION.

It is very gratifying to be able to report a revival of activity in this section, the *Silver Cup* and *Sunrise* on Nine-mile mountain, the *Mohawk* on Four-mile mountain, and New Hazelton Gold Cobalt Mines on Rocher Déboulé mountain, all being under small-scale operation during the summer and fall. All, with the exception of the *Sunrise*, extracted ore in the course of operations. All have closed down for the winter, but it is understood that in all cases work will be started up again early in 1926. This revival appears to be primarily due to the activities of W. S. Harris.

In addition to the foregoing, J. Miller, owner of the *Brunswick*, worked his property on Rocher Déboulé mountain steadily all year. It is to be regretted that the *Silver Standard* remained inoperative. The plant at the *Rocher Déboulé* mine is being dismantled and hauled down to the railway at Skeena Crossing, the Rocher Déboulé Copper Company having, it is understood, disposed of the machinery to the B.C. Equipment Company.

Frequent mention of properties in this section will be found in previous Annual Reports. In the Annual Report for 1914 a particularly clear sketch-map will be found. A full account of these properties will also be found in Memoir 110 of the Geological Survey, Canada, by J. J. O'Neill.

Four-mile Mountain.

Mohawk Group. This group, formerly known as the *Erie* and owned by W. S. Harris and associates, is situated on Four-mile mountain at the contact of the granodiorite and sedimentaries of the Hazelton group. Development-work was carried out in the form of some 35 feet of raising from the crosscut tunnel, at an elevation of 2,000 feet, to connect with a shaft previously sunk at the upper workings, and thus permit of readier attack of ore exposed at the latter point. The vein has been exposed for a considerable distance on the surface, varying in width from 2 feet to as wide as 7 feet at one point. The gangue is highly siliceous and the mineralization is mainly zinc-blende with a little galena, but the important

content is the silver values, which are high owing to the presence of grey copper. The ore is classed as a "dry" ore from the smelting point of view. This property is very close to transportation, being about 5 miles from Hazelton, and can be cheaply operated in a small way by hand-mining and close sorting.

Nine-mile Mountain.

Silver Cup Group. This group is situated on Nine-mile mountain and is owned by W. S. Harris and associates. The work done during the year consisted mainly in mining and shipping ore exposed on the surface above No. 1 tunnel, and also in the latter tunnel. (Plan and elevation of this property will be found in the 1914 Annual Report.) In all, 52 tons of ore was shipped. The ore consists of galena, zinc-blende, and jamesonite, and good silver values due to grey copper. The owners contemplate a considerable amount of development-work next spring.

Sunrise Group.—This property is also situated on Nine-mile mountain. During the year 200 feet of drifting was carried out under contract by W. S. Harris.

Rocher Déboulé Mountain.

New Hazelton Gold Cobalt Mines, Ltd. At this property, under the direction of W. S. Harris, a new tunnel, a drift on the main vein, was started from the surface where ore was exposed at a point considerably above the former main tunnel, which is situated at an elevation of 5,525 feet, elevation of camp buildings being 4,125 feet. The writer was unable to inspect the property after this work was started, but paid a visit prior thereto and noted the ore showing in the vein where exposed at the discovery post of the *Victoria* claim. This is at the summit of the mountain, where the vein crosses the ridge and shows a streak of high-grade (in gold) arsenopyrite and associated sulphides. The vein could not be traced on the surface at the time of inspection owing to snow. A sample representing a width of 4 inches of the solid sulphides assayed: Gold, 4.36 oz.; silver, 1.5 oz. to the ton. The elevation of the vein apex is 6,150 feet.

W. S. Harris reports that the drift was advanced a distance of 150 feet, ore being continuous for this distance, and the face showing a width of 18 inches of ore assaying: Gold, 5.4 oz. to the ton; arsenic, 50 per cent.; cobalt, 5 per cent.

The ore at this property contains an association of iron, arsenic, cobalt minerals, and molybdenite that is quite unique. Gold values of course predominate. It is not known at exactly what level the new tunnel has been run, but there would appear to be excellent prospects for profitable small-scale operations in 1925. In the course of driving the above tunnel some 30 tons of ore was yielded. This was sacked but could not be packed down during the fall to the railway.

Brunswick Group. This group, owned by J. Miller, is situated on Rocher Déboulé mountain at the head of Balsam creek. A good trail leads to it from the Rocher Déboulé wagon-road, following the north bank of Balsam creek. The position of this and other claims mentioned in this section will be readily seen by referring to the very clear sketch-map in the 1914 Annual Report. As the owner works single-handed on this property for a large portion of the year and each winter, evincing great tenacity of purpose, considerable progress is made.

The group is just below the *Red Rose* group and is situated in the sedimentary rocks of the Hazelton group in the near vicinity of the contact with granodiorite. The vein, striking N. 20° E. (mag.) and dipping westerly at a steep angle of about 75°, is opened up by two drift-tunnels on the vein, about 75 feet vertically apart. The hillside being covered with a thickness of about 10 feet of cemented drift at this point, the first 25 feet or so of each tunnel is in the nature of a crosscut.

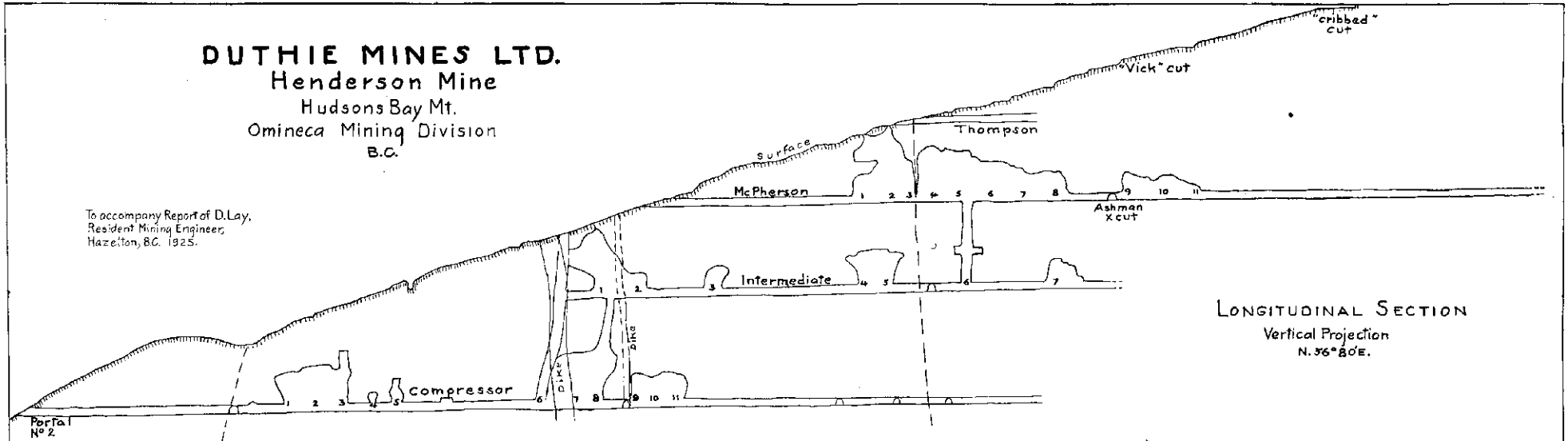
No. 1 tunnel, at an elevation of 4,350 feet, has been run a distance of 65 feet; the last 20 feet of this disclosed a width of 2 feet of mixed quartz, galena, and zinc-blende, with small amounts of chalcopyrite, and in this distance a tonnage of perhaps 10 tons of selected ore was obtained. A grab sample from this pile of ore assayed: Gold, 0.16 oz.; silver, 57 oz. to the ton; lead, 11.2 per cent.; zinc, 24 per cent. In the face the bottom of the tunnel showed a width of about 9 inches of sulphides.

DUTHIE MINES LTD.

Henderson Mine

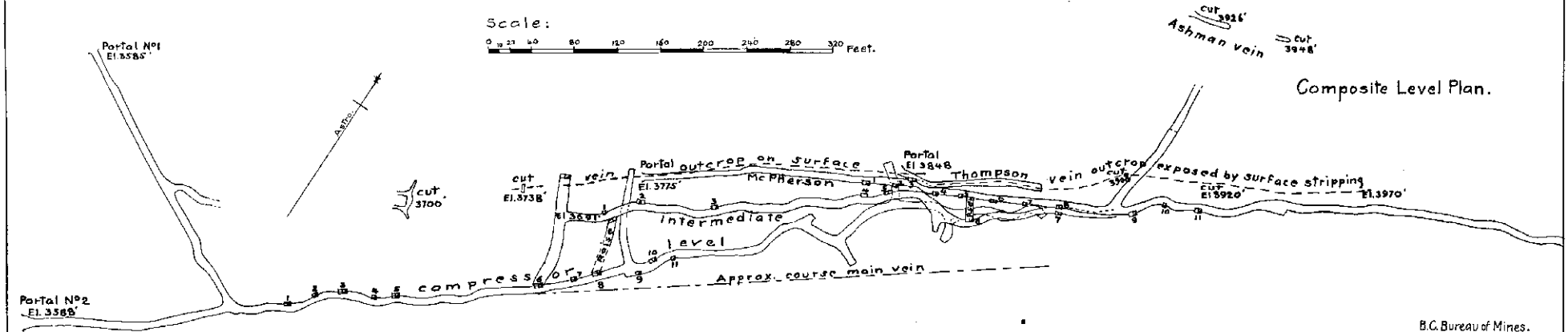
Hudsons Bay Mt.
Omineca Mining Division
B.C.

To accompany Report of D. Lay,
Resident Mining Engineer,
Hazelton, B.C. 1925.



LONGITUDINAL SECTION
Vertical Projection
N. 56° 80' E.

Scale:
0 10 20 40 80 120 160 200 240 280 320 Feet.



Composite Level Plan.

B.C. Bureau of Mines.

No. 2 tunnel, at an elevation of 4,275 feet, was run to meet the downward extension of the ore met with in No. 1 tunnel. The length is 170 feet, of which the last 140 feet showed a width of between 1½ and 2 feet of slightly mineralized quartz.

The tunnels are situated on a hillside which rises somewhat sharply from the creek-bed, where the trail from the wagon-road ends. Ore could be readily conveyed from the tunnels to this latter point by a very short aerial tram, which the owner hopes to construct. The cabin is situated at an elevation of 4,050 feet.

Brian Boru Group.—This group is situated at the head of Brian Boru creek and is owned by J. Creagh, who worked hard on his property during the summer. An inspection of this group was not possible.

TELKWA SECTION.

Hudson Bay Mountain.

Of great importance to the district was the resumption of operations on the *Henderson* property by Duthie Mines, Limited, at the end of June last under the management of J. R. Turner, followed later by development of the *White Swan* group. Very shortly after resumption shipments of ore from the *Henderson* mine were commenced at the rate of about 6 tons daily, a force of some thirty-five men being employed. Shipments during the year were fully expected to reach a total of 1,000 tons, but, unfortunately, the unusually mild weather prevailing during the fall greatly impeded motor-truck hauling from the mine to the railway at Smithers. For that reason the total, although nearly 800 tons, is somewhat below that anticipated.

The *Henderson* was inspected in July, at which time development had not been started on the *White Swan*. The writer has therefore not inspected the latter and is indebted to Mr. Turner for an account of the latest developments both at the *Henderson* and *White Swan*.

Henderson.

Full descriptions of this property will be found in the 1922, 1923, and 1924 Annual Reports. Upon resumption, preparations were immediately made to put the mine in condition to maintain an output of ore. Two hopeful features shortly became apparent:—

(1.) A trial winze sunk 12 feet below the compressor level disclosed one seam of good ore 10 inches in width and another 4 inches in width. The management therefore decided to sink two additional trial winzes in order to determine the best position for an extensive winze below this level, which should finally form the working-winze for lower development. In all, three trial winzes were sunk, each to a depth of 15 feet, proving continuation of vein and ore. A point for the final main winze was selected, but no work in connection with sinking the main winze could be started until pumps, new machines, and hoist could be got on the ground. This equipment is expected early in 1926. In the meantime a station has been cut for sinking the main winze.

(2.) In the course of reopening the stopes in the mine above the compressor level good ore was found to exist in the hanging-wall at several points, giving a total stoping-length on this level of between 375 and 400 feet. Further, appearances in the mine and the actual survey strongly suggested the possibility that the latter portion of the compressor level had followed a foot-wall branch vein, and that the main vein might be found in the hanging-wall by crosscutting in this region. Such crosscutting is to be started early in January, 1926. Early commencement of development at the *Henderson* had also to be considered in relation to the importance of carrying out the contemplated development of the *White Swan* group. Consideration of the twofold plan entailed purchase of additional equipment, pending arrival of which development necessarily remained somewhat in abeyance at the *Henderson*.

Improvements in equipment comprise changes in the ore-sorting shed, mainly in regard to installing a jig operated by power in place of the hand-jig. Two Kelly trucks have also been purchased for transportation of ore to Smithers. Aid to a liberal extent was given by the Department of Mines towards improving the wagon-road between Smithers and the *Henderson* mine.

White Swan Group.

This is also the property of the Duthie Mines, Limited, as has been mentioned. Reference to the map in the 1922 Annual Report will render clear its position relative to the *Henderson* mine. An air-line was run from the *Henderson* over to this property, a temporary camp established, and a drift-tunnel has been run on the vein a distance of 200 feet. Mr. Turner reports: "We have had mixed lead and iron averaging 2 feet in width for the entire distance."

Victory Group. This group is fully described in the Annual Reports for the years 1914, 1922, and 1923. In particular the Annual Report for the year 1923 leaves little to be added. The group consists of six mineral claims covering an area of about 250 acres. The development consists of Nos. 1, 2, 3, and 4 tunnels, 100, 65, 35, and 50 feet in length respectively, at elevations of 3,875, 4,075, 4,200, and 4,300 feet. Time did not permit of a highly critical examination (which was unnecessary in any event) and unfortunately the owner was not with the writer, who made the inspection alone.

The minerals noted were arsenopyrite, galena, zinc-blende, and a small amount of chalcopyrite. In places in the tunnels the association is very compact, extending to a width of 3 feet of fairly solid sulphides, but it is evident that nothing can be done in the way of sorting out a clean product. Crystallization is fairly coarse and there is nothing in the appearance of the ore to suggest that any problems in concentration will occur which cannot be readily solved. It is obvious that milling must finally be resorted to.

Further, the topography is very favourable for cheap development. Excellent camp buildings have been erected at an elevation of 3,925 feet, admirably situated for convenience to working-faces and affording ample accommodation for a small force of men. A relatively small amount of development seems likely to afford much insight into the property. Generally speaking, the conditions for cheap mining are good.

Yukon Group. This group consists of eight claims and is owned by Howard D. Thompson, A. Chisholm, and associates. It is situated on the eastern slope of Hudson Bay mountain at an elevation of about 5,000 feet, distant some 5½ miles from Lake Kathlyn, from which station a good trail leads to the property. One or more parallel fracture-zones occur in the volcanic country-rock and have been exposed at various points from the most southerly claim to the most northerly by open-cuts over a length of about 4,500 feet. The elevation of the highest point of exposure is 5,200 feet and that of the lowest 4,900 feet. At the north end, the highest point, mineralization is heavy, consisting almost entirely of pyrrhotite, assays of which proved to give barren results. At the south end of the property, at an elevation of 4,900 feet, the country-rock being rhyolite, the fracture-zone, striking N. 68° W. (mag.) and dipping 45° westerly, has been stripped for a length of about 250 feet, the average width of mineralization being 5 feet 6 inches. Mineralization here is, however, not by any means heavy and consists of small amounts of arsenopyrite, zinc-blende, pyrite, and pyrrhotite. The arsenopyrite appears to be the mineral which carries values. A sample picked from the *Yukon* claim assayed: Gold, 0.64 oz.; silver, 0.2 oz. to the ton.

Cascade Group. This group, owned by A. S. Millar and associates, is situated on the eastern slope of Hudson Bay mountain at an elevation of 3,600 feet. It is distant about 4½ miles from Smithers. A full account of this property will be found in the Annual Report for 1923. Work since this report has comprised continuation of the crosscut tunnel, which is 93 feet vertically below the showing of galena, zinc-blende, and pyrite in the upper tunnel, mentioned in the 1923 Annual Report. The objective of this crosscut is the anticipated downward continuation of this ore, the dip of which might vary between 35° and 55°. A force of three men was employed at this property during the greater part of the season, but slow progress was inevitable owing to the intensely hard formation. The owners report that at the expiry of work for the season the crosscut had been advanced to a point 340 feet from the portal, and latterly small stringers of galena and zinc-blende were coming in. They estimate another 30 feet of crosscutting is required to reach the objective. The owners have been wise in having an accurate survey of this tunnel made, so that its exact position is known in relation to the upper workings. The property is well situated and it is to be hoped that expectations will be realized.

Evelyn Group. This group, consising of four claims owned by Angus McLean and J. A. MacDonald, is situated on the north-eastern slope of Hudson Bay mountain at an elevation of between 4,450 and 5,275 feet. Between these points, extending over a length of about 2,000 feet, a wide fracture-zone is heavily stained with iron and shows in places a very sparse mineralization of galena, zinc-blende, and pyrite. The country-rock is volcanic, apparently andesite. The strike of the mineralization is N. 80° E. (mag.) with a southerly dip. A sample at one point across 10 feet assayed: Gold, trace; silver, 3 oz. to the ton. A sample of a small seam showing galena assayed: Gold, trace; silver, 43.5 oz. to the ton; lead, 16 per cent.

The owners are at present tracing this fracture down to lower points, hoping to find mineralization below timber-line, which would enable work to be carried on in winter. The lowest open-cut, at 4,450 feet elevation, just below timber-line, holds out some promise, but so far mineralization is more prevalent at the higher points.

Empire Group. This group, owned by Donald C. Simpson, is situated about 6 miles from Smithers, on the eastern side of Hudson Bay mountain, in a basin at the head of the South fork of Simpson creek. An excellent trail leads to the property from Smithers. There are said to be four veins on the property. Of these, time permitted of the inspection of workings on one only. This vein, striking nearly east and west (mag.) and dipping at about 60° southerly, is opened up by a drift-tunnel 40 feet in length. A width of 1 foot of fairly solid galena, zinc-blende, and pyrite was exposed. It is known that the ore assays about 1 oz. of silver to the unit of lead. The country-rock is mainly volcanic breccia. The property appears to be well worth further development.

Schufer Group.—An option was taken towards the close of the year on this property by the British-Canadian Silver Corporation. The latter intends starting development in the spring.

Canadian Citizen. This property, owned by T. Costello, is situated on the wagon-road to the Duthie Mines from Smithers and is distant only 2 miles from the latter place. An open-cut and small winze at an elevation of 1,975 feet expose a vein 4 feet 6 inches in width, striking N. 70° W. (mag.) and dipping 80° southerly, in andesite country-rock; the latter is mineralized beyond the vein-walls. Mineralization consists of bornite, azurite, and malachite. A sample taken across 4 feet 6 inches assayed: Gold, trace; silver, 4 oz. to the ton; copper, 3 per cent. The copper mineralization is promising and it is unfortunate that silver values are not higher.

Driftwood Creek.

Substantial aid was given by the Department of Mines towards the improvement of the Driftwood Creek trail, which leads into the Babine mountains, from the end of the motor-road from Smithers, which latter terminates some 10 miles from Smithers.

Silver King Group. This group, consisting of twelve claims, adjoins on the east the property of the Babine Bonanza Mining and Milling Company. It is situated in the basin at the head of Driftwood creek. The present working-tunnel is situated virtually on the floor of the basin, the elevation of which is 4,800 feet. A force of four men has been constantly employed all the year in running a crosscut tunnel, the objective of which was the penetration of a vein on which a drift had been previously run a length of 100 feet at a point 35 feet vertically above the crosscut. Mineralization in the drift consisted of galena, zinc-blende, grey copper, and some native silver. The strike of the vein is N. 55° E. (mag.) and the dip northerly. Silver values are high.

Towards the end of the year P. J. Higgins, who is in charge of operations, reported an important strike in the crosscut. At a point 252 feet from the portal the crosscut intercepted the main vein, it is reported, which proved to be 4½ feet in width, with a pay-streak 18 inches in width of high-grade galena, showing a little zinc-blende and a considerable amount of native silver. The indications are that this ore extends eastwards. At a distance of 200 feet the crosscut passed through a south vein 1 foot in width, also showing good ore. The strike of this south vein indicates that it will intersect the main vein about 30 feet east of the point at which the main vein was struck. The drift is being continued east from the end of the crosscut and preparations are being made to get out a shipment this winter. Prospects for this property appear to be distinctly hopeful and operations are being conducted in a thoroughly miner-like manner. The property is fairly well situated, being about 19 miles from Smithers.

Hyland Group. This group, owned by Martin Cain and T. King, was under bond to Messrs. Gale and Milligan, of Smithers, during the summer, but it is understood that they discontinued work after crosscutting from a tunnel, previously run approximately parallel to the strike of the vein. Inspection was made prior to the operations mentioned and was rendered somewhat difficult owing to snow. The vein outcrops in the immediate vicinity of the contact of slates and rhyolite. Mineralization, consisting of galena, zinc-blende, grey copper, azurite, and malachite, with high values in silver, appeared to be good and was exposed by various open-cuts. The strike of the vein is N. 35° E. (mag.). The elevation of the exposures is 5,600 feet. The property is situated at the head of Cronin creek.

Little Joe Group. This group, owned by Martin Cain and T. King, is situated at the head of Little Joe creek. At an elevation of 5,400 feet an adit-tunnel follows a vein, dipping 30° to 45° westerly and striking north-west and south-east, on the contact of rhyolite and schistose volcanic rocks. At 65 feet from the portal ore was met with, varying in width from 2 inches to 2 feet, and was continuous thereafter for a distance of 100 feet, when the vein was lost, the drift being apparently in the foot-wall. The predominant character of the mineralization is grey copper with small amounts of galena and zinc-blende. Upwards of 10 tons of high-grade ore resulted from this development. The comparatively soft schistose hanging-wall country-rock should greatly facilitate any mining operations.

On the *Iroquois* and *Shamrock* groups the respective owners, P. McPhee and J. Carson, carried out assessment-work.

On the *Harrar* group the owner constructed a cabin and performed assessment-work.

Harvey Group. This group is owned by C. G. Harvey and associates. C. G. Harvey was working on the group alone at the time of inspection and was engaged in driving a crosscut tunnel, previously run in from the surface a distance of 270 feet, at an elevation of 4,400 feet. The objective was the penetration of the downward continuation of the vein exposed in a shaft above, the collar of which is at an elevation of 4,550 feet. The depth of the shaft is 25 feet. This shows a well-mineralized vein striking N. 30° W. (mag.) 8 feet in width, showing copper-stains and a little chalcopyrite. A sample taken of the best mineral showing in this working assayed: Gold, 0.04 oz.; silver, 42 oz. to the ton; copper, 4 per cent. It is a noticeable feature of this property that silver values, which are due to grey copper, are good. This group consists of seven claims and on it there occur a number of mineralized zones in the andesite country-rock. The property is conveniently situated, being not much over 12 miles from Smithers. Workings are below timber-line and a good trail leads to the property from the end of the motor-road from Smithers.

Rainbow Group. This group, consisting of three claims, adjoins the *Harvey* group on the north-west. A bond was taken on the property by F. H. Taylor, of Smithers, in August. He has employed two men on development continuously and, it is stated, proposes to work throughout the winter. This group was not inspected by the writer.

Those interested in the above section will find a very full report thereon by Dr. George Hanson in the Summary Report, 1924, Part A, of the Geological Survey, Canada.

Telkwa River.

Kitchener Group. This group consists of four claims and is owned by Messrs. Gillespie, Wilson, and Goodwill. It is situated on Clear creek, at the headwaters of the Telkwa river, and is distant about 33 miles from Telkwa. A good sleigh-road runs from Telkwa (a town on the Canadian National Railway 10 miles east of Smithers) to the South Fork bridge, a distance of 17 miles, from which point a trail leads to Milk creek, a further 12 miles, and from the latter point a branch trail leads another 4 miles to the property. Liberal aid was given this year by the Department of Mines in improving the described means of access to the headwaters of the Telkwa river.

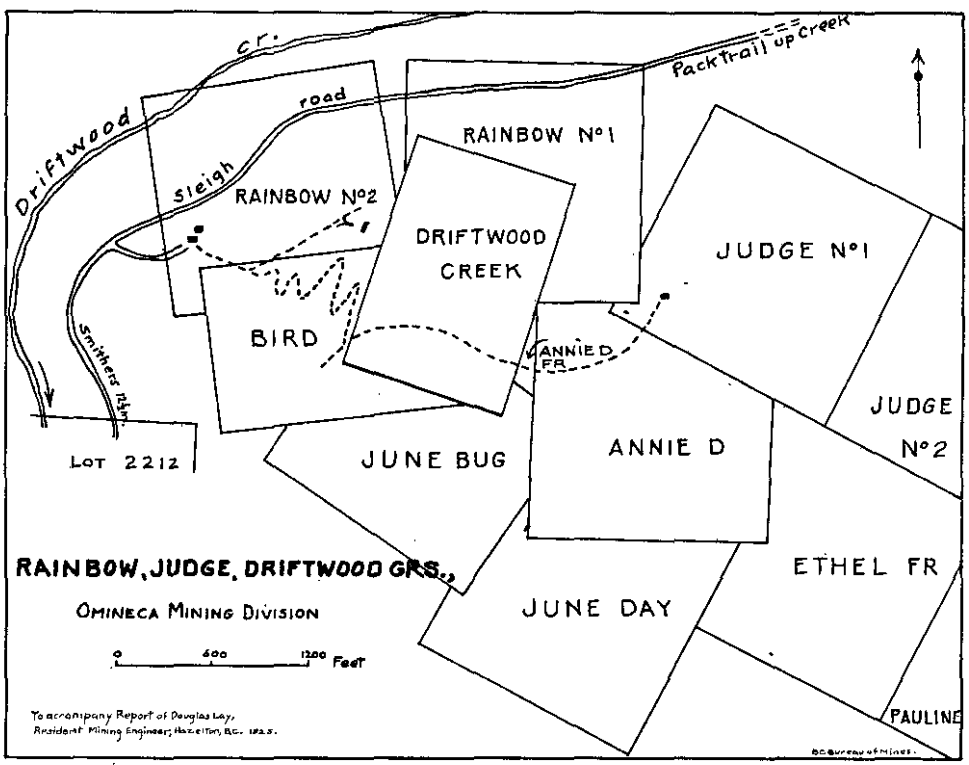
In the vicinity of the contact of the coastal granodiorite with the volcanics there is on this property in granodiorite a wide quartz vein, which is evidently very persistent and can be traced on the surface for a considerable distance. Development is purely superficial, by open-cuts. At the time of inspection many of the open-cuts had caved in and it was not possible to determine accurately the average width of the vein, which might be 6 feet or more. The average strike appeared to be N. 20° E. (mag.), with south-easterly dip, very flat at one point.

At one point the vein branches, the branch being also wide and striking approximately N. 15° E. (mag.). As mentioned, while exposures are purely superficial, both main and branch veins appear to be fairly well mineralized. The mineralization is essentially galena, zinc-blende, and pyrite, with occasional small amounts of chalcopyrite. At one point in the branch vein there is exposed a width of 5 feet of concentrating-ore. A sample across this width assayed: Gold, 0.3 oz.; silver, 2 oz. to the ton; lead, 4 per cent.; zinc, 2 per cent.

At the point of heaviest mineralization in the main vein there is exposed a width of 1.5 feet of heavily mineralized quartz. A shot or two at this point might possibly disclose a width of 6 feet of concentrating-ore. A sample taken across this 1.5 feet mentioned assayed: Gold, 0.44 oz.; silver, 5 oz. to the ton; lead, 8 per cent.; zinc, 12 per cent.

The exposures above referred to occur above timber-line at an elevation of between 4,700 and 4,800 feet. It is very gratifying to note gold values, but further work is necessary on this property with a view to determine some idea of the extent of the more heavily mineralized portions of the vein. At present only ore of a concentrating character is in evidence.

Rob Roy Group. This group is owned by Messrs. Gillespie, Wilson, and associates and consists of six claims. It is situated on Silver Tip mountain, which adjoins on the south Bonanza mountain, on which the *Kitchener* group is situated. On this group a persistent flat-dipping quartz vein is exposed by natural agencies on the south side of Silver Tip creek. At an elevation of 4,875 feet a width of 1 foot of quartz showed a few specks of galena and zinc-blende. It is stated that at one point there is visible a width of 4 feet of mixed galena, zinc-blende, and quartz. Unfortunately, at the time of inspection a snowslide quite prevented examination.

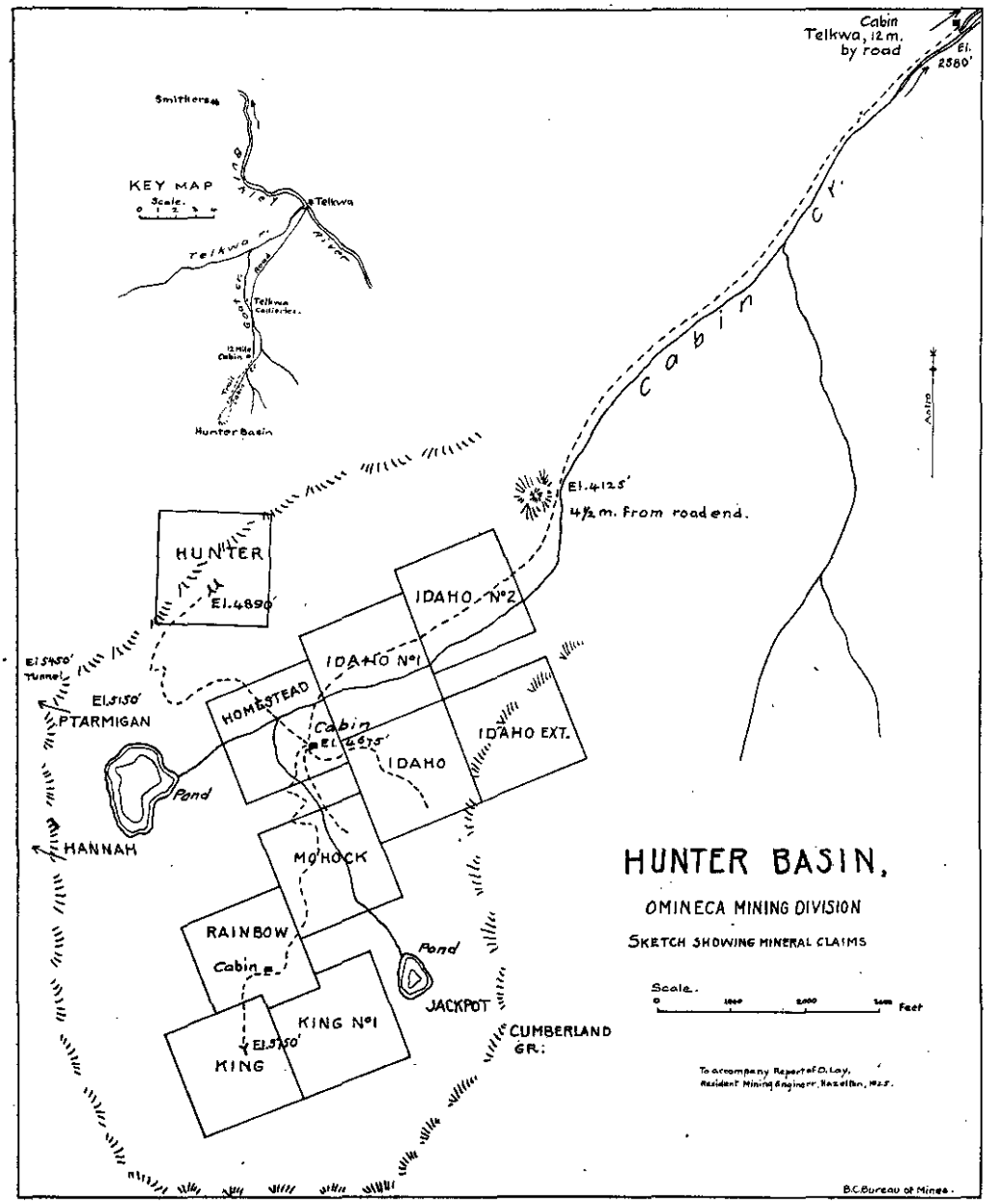


Hunter Basin.

This basin lies in a south-westerly direction from Telkwa, from which place it is reached by an excellent sleigh-road 12 miles in length followed by 4½ miles of trail. The latter rises on about a 7-per-cent. grade to the basin and was further improved during the year by a material grant from the Department of Mines.

The principal properties in the basin are the *Hunter* group, consisting of the *King*, *Rainbow*, *Mohawk*, and *Idaho* claims, and the *Riegle* group, consisting of the *Hunter*, *View*, and *Ptarmigan* claims. Both these claims are owned by O. A. Riegle, of Telkwa.

Hunter Group. A strike was made during the year on the *King* claim, a crosscut 120 feet long having struck the vein, which is exposed about 35 feet vertically above by an open-cut. At the time of inspection a drift had been run east from the end of the crosscut, stripping the ore, which consisted of a width of 12 inches of solid chalcopyrite, with a little bornite scattered through another seam about 6 inches in width. A sample taken of the compact chalcopyrite assayed: Gold, 0.02 oz.; silver, 12 oz. to the ton; copper, 23.3 per cent.



Riegle Group.—A crosscut tunnel from the surface was driven 108 feet on this property by T. McIver in bad ground requiring close timbering and spiling. This work was done in the winter and was stopped owing to severe climatic conditions.

Grouse Mountain.

An excellent motor-road (the main Provincial Highway) runs from Telkwa a distance of 16 miles to the base of Grouse mountain. A branch road some 5 miles in length leads to the summit of the mountain, which has a flat top, and the elevation of which is about 4,700 feet. On the plateau-like summit are several small lakes and the site for mine camps is excellent. The principal claims are those owned by the Cassiar Crown Copper Company and Louis

Schorn, of Telkwa, but a number of other claims are held by different individuals, who were engaged on their various properties doing assessment-work during the summer. Noteworthy strikes were made on the *Lakeview* and *Cornu Copia* properties.

Lakeview. This property, situated by the side of a small lake, is owned by Louis Schorn and was developed during most of the year by two men. The main showings of the claim are several parallel shear-zone fissures well mineralized, some of which are not more than 20 or 30 feet apart. The strike of these shear-zones, which are in schistose volcanic rock, is approximately north-west and south-east (mag.). The width of the zones is between 4 and 8 feet and the mineralization is essentially fairly solid zinc-blende studded with chalcopyrite.

Development-work on this property consists of one tunnel about 20 feet in length, just above the lake-level, following mineral exposed on the surface a short distance above, and another tunnel 80 feet in length run at a somewhat higher level, following another shear-zone parallel to the first mentioned. This tunnel follows the foot-wall of the vein throughout its length. At 50 feet from the portal a crosscut run to the hanging-wall had disclosed a width of 4 feet of fairly solid mineral, but had not at the time of inspection reached the hanging-wall. A fair sample across the 4 feet assayed: Gold, trace; silver, 10 oz. to the ton; copper, 3 per cent.; lead, *nil;* zinc, 34 per cent. Since inspection the owner reported that he had reached the hanging-wall, passing through a total width of 8 feet of mineral.

Cornu Copia Group. This group is owned by J. Oakes, J. Donaldson, and K. Noisven. A strike of high-grade ore was made on this property, and while the showing is at present extremely small, nevertheless, having regard to the fact that hitherto only low silver values have been met with on Grouse mountain, it is an incentive to further development. There are various points on this group at which mineralization occurs in shear-zones, but in no case is the mineralization heavy, nor has it been actively followed up. The high-grade mineral occurs in a vein which varies in width from 6 to 15 inches and which shows in places grey copper, specular iron, and copper-stains. A sample of the best mineral showing assayed: Gold, 1.7 oz.; silver, 204 oz. to the ton; copper, 6.5 per cent.

The vein has been exposed by an open-cut and appears to strike N. 25° E. (mag.), dipping easterly. It is as yet quite premature to say just what this discovery will amount to.

Black Fox. This claim is owned by F. Dobey. An open-cut exposes a width of 5 feet showing an appreciable amount of zinc-blende and chalcopyrite. The shear-zone strikes N. 40° E. (mag.) and dips westerly. A picked sample of this ore assayed: Gold, trace; silver, 34 oz. to the ton; copper, 10 per cent.; lead, trace; zinc, 14 per cent. The owner should follow this up.

Rainstorm, Maisie, and Hidden Treasure.—On these claims the owners carried out assessment-work, but were not present at the time of inspection. The last mentioned is a recent location by Walter Skelhorne.

Venus Group. This group is owned by A. S. Millar and J. Bussinger and is situated on Mineral hill, at the south end of Grouse mountain. The owners report promising mineral in a shaft sunk from the surface on a vein showing a pay-streak on the surface 3 or 4 inches in width, in which occur galena, zinc-blende, chalcopyrite, and grey copper. At the time of inspection the shaft was full of water. A sample from a few tons of picked ore piled at the collar of the shaft assayed: Gold, 0.04 oz.; silver, 147 oz. to the ton; copper, 6 per cent.; lead, 14 per cent.; zinc, 36 per cent.

The owners state that it is their intention to sink this shaft another 100 feet next year. This group is readily accessible, the main highway running along the base of the mountain on which it is situated. The distance from Telkwa is about 20 miles.

Some assessment-work was done on the *Satan* and *Bruneis* claims, owned by P. Teckoles, south of Mineral hill.

Dome Mountain.

No activity is reported in connection with Dome Mountain properties.

HOUSTON SECTION.

This section embraces the area tributary to the town of Houston, a station on the Canadian National Railway 40 miles east of Smithers, and extends south-west of the railway, including the Owen Lake region.

Silver Queen Group.

This group is owned by H. C. Wrinch and is situated about 1 mile north of Owen lake, some 28 miles from Houston. The Annual Reports for the years 1916, 1923, and 1924 leave little further to be said, as no work has been done since 1924. While it is evident that the ore will require milling prior to shipment, general appearances indicate that development of this and the neighbouring group, the *Diamond Belle*, will disclose, at any rate, a joint tonnage adequate to warrant the erection of milling plant. Geologically, the area is promising. While the distance from railway shipping-point is 28 miles, 16 miles of this from Houston is a motor-road and the remaining 12 miles of sleigh-road could readily be improved and probably shortened somewhat.

BURNS LAKE SECTION.

Two companies are operating at or near Babine lake, distant by road and trail some 28 miles from Burns Lake, a station on the Canadian National Railway, 317 miles east of Prince Rupert—namely, Silver Island Mining Company and Taltapin Mining Company. The map on page 102 of the 1924 Annual Report shows the road and trail in question. It may be noted that progress has already been made with the road marked "Proposed road"—a shorter route.

Silver Island Mining Co.

This company owns eight mineral claims, of which two are situated under Babine lake; one, the *Silver Island*, covers the surface of Silver island on Babine lake and the remaining claims are on the mainland. All workings and important surface showings are confined to the *Silver Island* claim, which covers the island mentioned and has an area of about 22 acres. Silver island is situated on Babine lake and distant some 3,000 feet from its south shore. The island is about 1,300 feet in length by 750 feet in breadth, elliptical in shape, and its highest point rises about 135 feet above the lake. Its surface is fairly flat, with the exception of the high point mentioned, and it is well timbered.

Geology.—As far as could be determined by examination of surface and by circling the island in a motor-boat, about half the island is composed of a dark-green diorite and about half of rhyolite, the line of contact running diagonally across the island. Approaching the island in a motor-boat from the south shore of the lake, the white rhyolite at the southern end forms a striking contrast to the dark northern portion. Rhyolite also outcrops on the southern shore of the lake, immediately opposite the island. The rhyolite dips in a southerly direction at an angle of about 45°.

Veins.—Two or more fissures in the diorite and one in the rhyolite, all being only a few inches in width, show on the steep faces of the rocks immediately above the lake. For a distance of 50 feet or so on the surface of the island high-grade silver minerals occur, among which were noted grey copper, argentite, and native silver, and small amounts of galena, zinc-blende, chalcopyrite, and copper-stains of malachite and azurite. The gangue minerals are calcite, barite, and quartz. It is reported that small nuggets of silver have been found. These high-grade stringers strike due east and west (mag.) and dip southerly at an angle of about 45°. Mineralization also extends at some points beyond the walls of the stringers into the country-rock.

Workings.—In addition to surface strippings, two tunnels following the stringers have been run in at the lake-level immediately above high-water mark. These tunnels are 65 feet apart. Of these, No. 1, the more southerly, followed a weak mineralization inwards for a distance of 75 feet. Drifting was discontinued at this point and a winze commenced at a point 50 feet from the portal, which was down 67 feet at the time of inspection and was then in active progress. Appearances in the bottom disclosed some of the high-grade mineral in the country-rock apparently outside the fissure, and the bottom was promising in showing more mineral than higher points, but proof is wanting that any extensive occurrences of valuable mineral beyond the walls of the fissures is to be expected.

No. 2 tunnel was run in a total distance of 153 feet and two winzes were sunk from it—one to a depth of 47 feet at 83 feet from the portal and the other to a depth of 24 feet at 136 feet from the portal. In this tunnel rich mineral was fairly persistent up to the first winze, but the streak was only about 1½ inches in width. No. 1 tunnel was run wholly in diorite, but No. 2 was started in rhyolite, passing into diorite at 92 feet from the portal.

Equipment.—Good serviceable log camp buildings have been erected, sufficient for the accommodation of twelve men, the force employed at the time of inspection. A 16-horse-power vertical

steam-boiler, hoist, 5-horse-power gasolene-engine for operation of exhaust-fan, and Sullivan Water Leyner machine-drill, operated by steam, were installed and in operation at the time of inspection. A small steam-engine designed to operate a small sawmill was also on the ground.

Inasmuch as only a trail leads from the end of the road to Taltapin mine to Babine lake, the Silver Island Mining Company can only make use of the existing road from Burns lake as far as Pinkut lake, at which point transfer of freight to a scow on Pinkut lake takes place. A scow operated by an Evinrude engine takes freight to the north end of Pinkut lake, whence it is hauled by road a distance of 6 miles to Donald's Landing on Babine lake, and transferred again to scow on the latter lake for the distance of 10 miles to Silver island. This route is open only in summer. It speaks well for the efficiency of those in charge of operations that such a plant as that mentioned has been assembled in the face of great difficulties.

It is suggested that it would be well to suspend excavational development and endeavour to trace by surface prospecting the extension of the fissures on the island, especially in the vicinity of the diorite-rhyolite contact. The present development indicates the advisability of employing underhand-stoping methods in the mining of any rich stringers that may be found on the surface. The results of the assay of the sample of country-rock taken indicate that it might be well to take additional samples of the country-rock between the fissures and near the diorite-rhyolite contact, from which useful conclusions might be drawn.

The following samples illustrate the grade of ore contained in the narrow fissures:—

Description.	Gold.	Silver.	Copper.	Lead.	Zinc.
	Oz.	Oz.	Per Cent.	Per Cent.	Per Cent.
Selected sample of small bunch ore, bottom winze, No. 1 tunnel	Trace	243.6	3.0	*Nil*	3.0
Sample of picked ore, No. 2 tunnel, 1½ inches in width	Trace	693.6	8.0	*Nil*	3.0
Sample of country-rock by diorite-rhyolite contact	Trace	9.2	Trace	*Nil*	2.0
Sample of best ore showing on surface over No. 1 tunnel	Trace	556.0	5.5	0.5	7.0

Taltapin Mining Co.

The property of this company is situated on Anderson creek (called also 15-Mile creek), some 3 miles south of Babine lake. (Refer to map, page 102, Annual Report for 1924.) It is distant by rough road some 25 miles from Burns lake.

A full account of this property will be found in the Annual Report for 1920. Development since that report has consisted mainly in sinking a shaft to a depth of 90 feet. This shaft had for its objective the penetration of the "high-grade" vein. While cutting out a pump-station at the bottom of the shaft, it is stated, a vein not exposed on the surface was penetrated and a width of 3 feet of good ore exposed. At the time of inspection the shaft was partially filled with water and consequently inspection of this strike was rendered impossible. A sample was taken of a pile of ore at the collar of the shaft which it was stated had come from the strike in question. This sample assayed: Gold, trace; silver, 3.6 oz. to the ton; copper, 1 per cent.; lead, 3 per cent.; zinc, 27 per cent.

It is to be noted that the objective of the shaft—namely, the penetration of the "high-grade" vein—has not yet been reached.

Mona Group.

This group consists of three claims owned by E. R. Owen and J. L. Owen. The owners' agent is O. W. Owen. The property is distant about 10 miles south of Burns Lake. A private road 1 mile in length leads from the Burns Lake–Francois Lake Government road to the property, which is situated on Deep creek, flowing into Tschesinkut lake.

Workings.—These consist of four open-cuts situated immediately above Deep creek, only one of which discloses any mineral worthy of note. This open-cut, known as the "No. 1," exposes a vein having a width varying between 1 and 2 feet and extending for a length of approximately 10 feet. Mineralization, which consists mainly of galena, with a very small amount of chalcopyrite, is largely confined to a width of a few inches on the foot-wall. Scattered amounts of the minerals mentioned also occur throughout the vein-filling, which consists of barite, country-rock, and quartz. The country-rock is andesite. There is some evidence pointing to the possibility that at this point the fracture may be 10 feet in width, having a strike of approximately

N. 50° E. (mag.), the mineralization mentioned occurring as a veinlet within the major fissure. At the mouth of No. 1 open-cut there is also a small winze, full of water at the time of inspection, stated to be 20 feet in depth.

A sample taken of the best mineral showing along the length of 10 feet and averaging in width between 3 and 9 inches assayed: Lead, 6 per cent.; gold, trace; silver, trace. At the request of the writer, and in his presence, O. W. Owen took a sample from the same place, which assayed: Lead, 4 per cent.; gold, trace; silver, 0.6 oz. to the ton. A piece of galena from a small dump at the mouth of the open-cut was selected with a view to ascertain the grade in silver. This assayed: Lead, 56 per cent.; silver, 1.4 oz. to the ton. Obviously, therefore, the grade of the mineral is extremely low in precious metals.

The prospects in connection with this group cannot be considered in any degree hopeful. There is no justification for the installation of a compressor or any other surface equipment at the present time to enable the showings of low-grade mineral to be followed up more vigorously.

Cymric Group. This group is situated about 450 feet vertically above the *Mona* group on an elevated plateau and distant about 1 mile from the workings of the latter group. Between these two groups there is another claim, or claims, owned by Mr. Newman. There are no workings on the *Cymric* group, but an inspection was made of the surface. At all points of the latter andesite outcrops and quartz float is much in evidence. Several pieces of float were noted to be faintly mineralized and one piece showed a considerable amount of lead, assaying: Lead, 22 per cent.; gold, trace; silver, 3 oz. to the ton. At one or two points it was noted that quartz exposed might prove to be in place, but at the time of inspection no mineral of value had been discovered on this group in place.

SIBOLA SECTION.

A report has come to hand of the discovery of high-grade mineral on Tesla mountain, south of Eutsuk lake. Information is to the effect that the ore assays $150 a ton, but details are lacking. The distance from tide-water is about 35 miles and it is probable that this year assistance will be given by the Department of Mines in connection with building a trail from Kimsquit Cannery, on Dean channel, into this section.

Those interested in the Sibola section will find very full information concerning it in the Annual Report for 1916 by John D. Galloway; in the Geoelogical Survey, Canada, Summary Report, 1920, Part A, by R. W. Brock; and in the Geological Survey, Canada, Summary Report, 1924, Part A, by J. R. Marshall.

Emerald Group.—This group, on Sweeney mountain, was examined by various field engineers during the year.

MANSON SECTION.

In the Annual Report for 1924 will be found a full account of the inspection trip into this section made that year by the Resident Engineer, John D. Galloway. The section was not again visited this year.

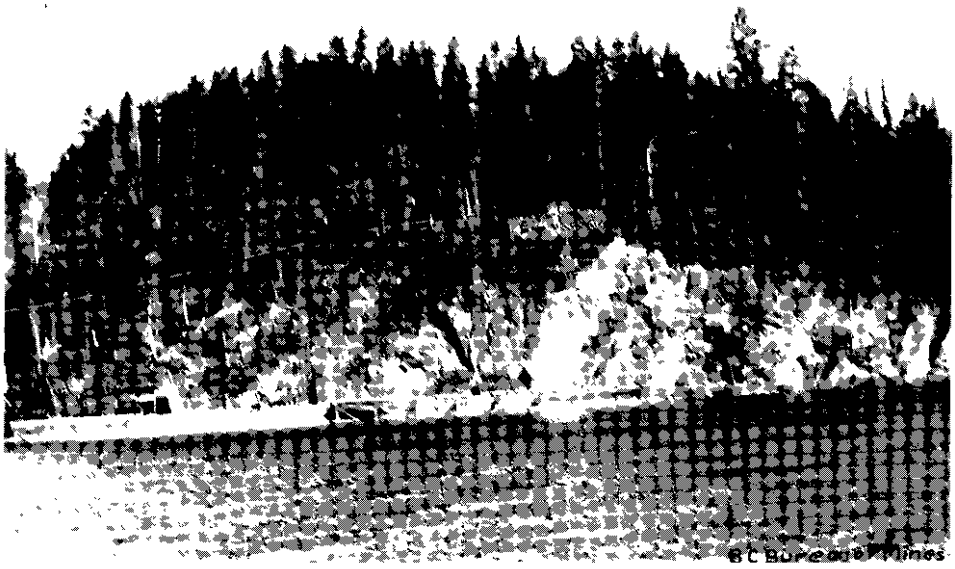
The following account of activities during the present year is kindly supplied by W. B. Steele, Deputy Mining Recorder at Manson Creek:—

"Robert H. Fleming has been drilling on the placer leases he controls on Manson creek. It has cost him in the neighbourhood of $3,000, I believe, counting in the price of the drill, freight on same, wages and provisions, etc. Mr. Fleming does not think much of the claims on the upper part of Manson (too many boulders to work the ground profitably), but he does think very favourably of the claims at the lower end of Manson and fully intends coming in early next season.

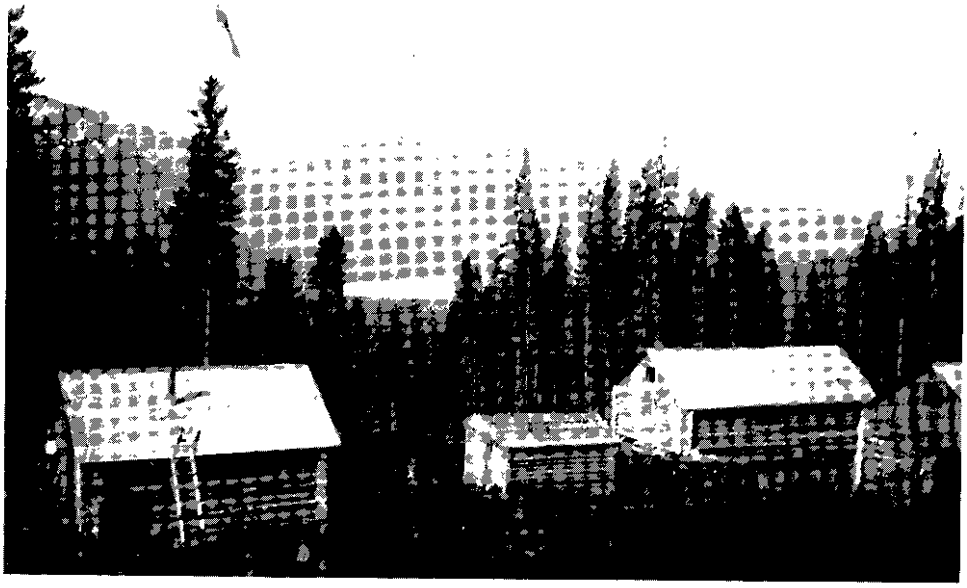
"The drilling on Slate creek was a success in so far as getting a good gold showing, but it also proved that Slate Creek property cannot be worked by dredging; the channel is altogether too narrow for a dredge of the size required.

"V. A. James, of South Porcupine, Ontario, was in here last summer and staked and recorded forty mineral claims. He also staked and recorded some more mineral claims in the vicinity of Takla lake, I believe. He intends to be back early next season and doing some development-work. There were several other parties in here.

"Ah Luck, on Germansen creek, has been busy rehabilitating his hydraulic pipe, which was somewhat damaged by a mud-slide. He makes from $10 to $14 a day on his claim after he gets the overburden piped off. Bill McCormick, on Tom creek, has struck the original channels of Tom creek and expects to be taking out the real stuff soon."



Silver Island Mining Co., Babine Lake.



Victory Mine, Omineca M.D.

Mica-mines near Fort Grahame.—It is of particular interest to report that the General Holding Company, of Edmonton, which has been carrying on development-work with a force of ten men ever since spring, is continuing operations all this winter and anticipates increasing its force early in 1926, at the same time commencing shipments. It is believed that the quality of this mica is good. The properties of this company are situated on Mica mountain, about 10 miles from Fort Grahame, which is situated on the Finlay river. Assistance in connection with trails has already been authorized by the Department of Mines and an inspection of this property will be made as early in 1926 as possible.

COAL.

This year a satisfactory increase was made in the coal-output, and it is reasonable to anticipate that the 1926 production will be considerably greater, since the unusually mild weather in the fall greatly impeded hauling. Further, it seems likely that a somewhat wider market will be found in the near future.

The entire coal-output comes from Telkwa Collieries, Limited, the president and general manager of which is J. McNeil, Telkwa. This company is at present operating its Goat Creek Colliery only, situated on Goat creek, distant 5 miles from Telkwa, on the Canadian National Railway. At present the yield has resulted from development only, and only operations in a very small way have been carried on, the colliery being operated and coal shipped in winter only, when hauling is cheapest.

Aid was given by the Department of Mines this year in improving the wagon-road between the colliery and Telkwa to permit of hauling by motor-truck before advent of snow. The output for the year was 1,581 long tons as compared with 1,228 tons in 1924.

In the Annual Report for 1924 will be found a list of the various coal areas of this district, likewise a list of various reports thereon.

CARIBOO MINING DIVISION.

The placer production of Cariboo Mining Division was $151,627. Hydraulic operators were hampered by a dry season and the Cedar Creek Mining Company was inactive during the first half of the year. Offsetting these decreases is the output from the Kafue Copper Development Company dredge near Barkerville.

At a time when the successful operation of a modern-type dredge marks the commencement of a new chapter in the placer-mining history of the Cariboo it seems opportune to emphasize a great need of the district; that is, the generation of electric power at a central point and its distribution throughout the district. It is well to bear in mind, having regard to possible avenues of expansion beyond those germane to the mining industry, that when conditions justify its installation power is available; for example, on Swamp river and other streams.

Present practice is to gather up water from the drainage areas which lie above the point of consumption, entailing a great mileage of ditches, many of which assume the proportions of canals. Such a system involves an expenditure of capital in a way in which it must ultimately be lost beyond recovery; a ditch cannot be moved to another place—a pump can be readily moved from one place to another. Further, such a system as now in vogue, even when completed, is largely dependent upon rainfall; a dry summer means a poor hydraulic run. At all times the best results can only be obtained in the spring and fall of the year.

BARKERVILLE SECTION.

The successful operation of the modern-type bucket-dredge on Antler creek by the Kafue Copper Development Company is, of course, the outstanding feature of placer-mining operations. This will undoubtedly lead to searching investigation of all other possible dredging areas which have not already been examined and may be followed by the installation of other dredges. In this connection the policy of the management of the Kafue Copper Development Company in generously freeing for publication details of operating costs and profits won is of the utmost assistance and interest to others and is warmly appreciated.

An unfortunate accident to the "Rowe Circulating Dredge" on Swift river, results from which were awaited with great interest, tied up operations for the year.

As has been mentioned, hydraulic operators suffered from a dry season. Chief among these were the operations on Lowhee creek by John Hopp.

A keen interest was shown in lode-mining and of particular interest are recent developments on Barkerville mountain, Cow mountain, and Cunningham creek. Older properties on Island and Proserpine mountains also received attention. All such clearly indicate that lode-mining possibilities are well worth close scrutiny. It is especially to be noted that no development whatsoever has been undertaken by capital in this district since Dr. Uglow's careful study of the vein systems and in the light of modern milling knowledge.

Antler Creek Dredge.

Through the courtesy of C. A. Banks, manager of the Kafue Copper Development Company, the following information regarding the operations of the company's dredge on Antler creek have been received for publication:—

"The dredge was built in 1924 and the machinery was, in December last, turned over and found to be satisfactory. The dredge was then closed down on account of weather conditions.

"In April last we started up and commenced digging to bed-rock, which we reached in May.

"From May we have dredged between 60,000 and 70,000 cubic yards monthly—the boat was built for 60,000.

"Our operations to August 20th were almost wholly in ground which had been drifted in the early days, but in spite of this we have since June 1st been paying our way.

"On August 20th we got out of the old workings and since then have been taking out, roughly, $750 daily, with conditions steadily improving. Our monthly costs are around $6,500, or, say, 10 cents a yard. The total recovery for the year was $95,066.

"C. W. Moore is dredgemaster and approximately twenty-seven men are employed."

The gold is coarse and 90 per cent. of it is caught on the first 5 feet of riffles.

A very full account of the constructional details of this dredge will be found in the Annual Report for 1924. It is interesting to note that, with the exception of one piece of timber, all lumber used in construction was sawn on the ground at the company's sawmill.

The remarkable performance of the power plant on the dredge calls for comment. The two Lanz Mannheim superheater condensing locomotive-type boilers, compound engines, while nominally of 90 horse-power capacity, have, it is estimated, yielded fully 100 horse-power each on a fuel-consumption of 2 cords of wood each in 24 hours of continuous running service. The size of the boilers appears absurdly small in proportion to the power yielded. So far as is known, this type of boiler is unique in British Columbia. For purposes of comparison it might be mentioned that in the case of another installation in operation, of about the usual type, two bricked-in boilers of the same rating, installed in 1923, consume 5 cords of wood a boiler under full duty.

Boilers on a dredge have hard service owing to constant surgings, and it is safe to say that such efficiency as that mentioned as yielded by the dredge installation has not hitherto been reached by small steam plants in British Columbia.

The piles of tailings which are rapidly growing in the wake of the dredge bear witness to the digging-powers of the modern dredge, and in this connection it is interesting to give particulars of the largest dredge yet constructed, operating at Yuba, California. This digs 20,000 yards a day, digs to a depth of 103 feet below water-level, and copes with a bank 20 feet high—a total range of 123 feet. The gravel being treated averages 12½ cents a yard and the cost of operation is 4½ cents a yard. The size of the dredge-buckets is 18 cubic feet. The cost of this dredge was $1,000,000. The particulars of this dredge were kindly supplied by G. A. Dunlop.

Lowhee Creek.

Lowhee.

Hydraulic operations were carried on at the *Lowhee* mine, Laurent Muller being superintendent. The face of the pit has now been advanced right up to the face of the old reservoir dam. A new dam was constructed last year on the crest of the summit between Lowhee creek and Stouts gulch. The ground between the two dams will come under attack next year. This tract is supposedly virgin and rich. A marsh exists in this region and it seems only reasonable to anticipate that the old-timers were unable to reach bed-rock below this region, in which case the yield from the remaining ground will probably be high. During this year it was found that the old-timers had drifted right up to the face of the old reservoir dam; that is, to the present limit of the pit. It might be mentioned that

the dimensions of this pit are about 300 feet wide at the top, 75 feet wide at the bottom, the depth is about 150 feet, and the length about 5,000 feet. Lining of the flume with manganese-steel plates has proved very satisfactory. The plates are 46 inches square and ½ inch thick, the flume being 4 feet wide.

Other Placer Properties (Tributary to Barkerville).—Small-scale operations were carried on by the following: On Cunningham creek by Messrs. Tregillus and Reed; on Walker gulch by Messrs. Stevens and Ross; on Ketch creek by Houser Bros.; at 8-Mile lake by Messrs. Cornish and Ross; at Shepherd creek by R. D. Rees; on Pine creek, near 8-Mile lake, by J. P. Roddick; and on Dragon creek by Messrs. Delhanty, McDougall, and Houser Bros. (small-scale drift-mining).

Lightning Creek.

Several small-scale operators have been working on Lightning creek or its tributaries near the town of Stanley.

On Lightning creek G. M. Murdoch has been endeavouring to discover the source of the gold discovered in the old days on the famous *Butcher and Discovery* claim, above which he has the *Butcher Bench* lease.

On the main Lightning creek G. R. Shaw and H. Eden were also working on their respective claims.

On Last Chance creek Kwong Lung Kee worked all the season; on Poorman creek Messrs. Sandberg and Kellman were at work; and on Boulder creek J. F. Williams was engaged in ground-sluicing and running a tunnel to tap an old channel.

Lightning Creek Gold Gravels and Drainage Co., Ltd.—A full account of the history of this company will be found in the 1923 Annual Report. No work was done in 1925, H. Jones being in charge as watchman at Wingdam. Towards the close of the year the company again became involved in litigation.

Swift River.

Gold Dredging Syndicate, Ltd.—This company owns a group of leases on Swift river, about 5 miles above Cottonwood. In the 1924 Annual Report will be found an account of the holdings of this company and of the "Rowe Circulating Dredge."

During the early part of the year the dredge was completed, the whole being mounted on a raft moored in the Swift river. Owing to some untoward happening the raft broke loose from its moorings and became stranded on a bar in the river. Owing to high water nothing could be done at the time to recover the raft and machinery, but it is understood to be the intention to build a scow and transfer the machinery to it.

Boyd Creek.

Old San Juan. This property, originally worked in the early sixties and now covered by lease No. 1540, was reinvestigated by the lessees, Frank Sweatman and associates. The property is situated just at the junction of Mary and Norton creeks (the creek formed by the junction being Boyd creek), distant 6 miles by trail from Cottonwood. Rim-rock gravels were washed in the very early days by ground-sluicing. Later, in 1893, an attempt was made by Peters and Norton to sink to bed-rock, a Cornish pump and water-wheel made on the ground being used to cope with the water. While early records leave the matter in doubt, it is believed that they failed to reach their objective.

This year Frank Sweatman and associates commenced small-scale testing operations by ground-sluicing on Boyd creek, somewhat below the scene of earlier operations, with a view to forming some idea of hydraulic and other possibilities. Dump facilities are poor and would necessitate elevation of tailings. However, there is plenty of water in Boyd creek, and, assuming that adequate testing beforehand justified hydraulicking, a "pump hydraulic" system would be preferable to bringing in pressure-water a long distance from some point on Mary creek. Dredging possibilities, as yet quite unproven, are indicated in this region.

It is interesting to mention that the dam constructed at the head of Norton creek by the beavers is a singularly fine example of their workmanship. It is about 100 yards in length and has been used from the earliest times by the various generations of placer-miners who have worked at this property.

Fraser River.

Tertiary. This property, owned by the Tertiary Gravel Company, is situated at Cottonwood canyon, on the Fraser river, 18 miles above Quesnel. It is described in the Annual Reports for the years 1917, 1918, and 1923. The property is now being worked by a partnership consisting of D. D. Fraser and J. McHardie. Inspection of this mine was not possible, but the following account of the year's operations has been supplied by D. D. Fraser:—

"We started the year with four muckers, two machinemen, one timberman, one blacksmith, one roustabout, and one engineer. Muckers worked on contract at 40 cents a car (1 ton net); the four mucked from 45 to 55 cars daily. Trouble was experienced with surface water causing caving ground and about May 1st we had to reduce our force. The latter was further reduced later to just one man besides us two partners. We are still working that way. Our workings are nearly under a small stream and this water gives trouble. As soon as we get out of this water the bulk of our troubles should be over. Our face is now around 900 feet from the portal. The width of our workings varies from 12 to over 50 feet. Values are by no means evenly distributed, but I can see little change in the values throughout the worked-out portion, which has yielded over $30,000. We recovered $7,500 this year. With the ground as heavy as it is we necessarily have to proceed slowly. We are hoping for better results as soon as we can get into the dry."

LODE-MINING.

It is important to note that timber-line throughout the Cariboo District is at an elevation of about 5,700 feet.

Island Mountain.

C. J. Seymour Baker (who also owns property on Proserpine mountain) has had a force of men cleaning out the tunnels run many years ago on the well-known "John's Ledge." He owns three Crown-granted claims formerly the property of the Island Mountain Mining Company. Oxidized surface ores in this region were washed with a rocker many years ago, it is stated, and a considerable amount of gold recovered. C. J. Seymour Baker has an assay office in Barkerville and carries out many investigations in connection with ore-treatment.

Proserpine Mountain.

In the Annual Report for 1918 will be found a description of properties on this mountain, likewise a map. The principal properties are those at the north-western end—*Proserpine*, *Proserpine South*, *Proserpine West*, and *Proserpine East*, owned by C. J. Seymour Baker; various claims marked on the map in the 1918 Annual Report, owned by Messrs. Tregillus, Blair, and associates, and which lie between Seymour Baker's group at the north-west end; and the *Independence* group, owned by E. E. Armstrong and situated at the south-eastern end. All these claims are situated at an elevation of about 5,500 feet and the topography is somewhat flat.

In 1919 an option was taken on the properties owned by Armstrong and Tregillus and associates by a Toronto syndicate. The latter in that year constructed excellent camp buildings on the *Independence* group and employed a force of sixty men. After some surface crosscutting and running some tunnels the option was allowed to lapse in 1920. There are many excellent surface showings on these properties which were not followed up by the syndicate in question. Reference to the assays of samples in the 1918 Annual Report will render surface values evident. It is superfluous to point out that the work of the syndicate in question was not conducted in the light of Dr. Uglow's studies of the Barkerville vein systems, which had not been undertaken at the time of the operations by the syndicate. Extensive quotations from Dr. Uglow's report are given in the 1922 Annual Report. Reference to the latter will show that Dr. Uglow calls attention to many hopeful features in connection with the properties in question. On general principles the importance of following a good surface showing is apparent, and in the case of Barkerville veins, where secondary enrichment occurs on the surface, it is imperative to ascertain the gold content of the primary sulphides, which are to be found at a comparatively shallow depth, within 50 feet or less. Dr. Uglow's conclusion that there is "no apparent reason for any rapid change in the character of the primary minerals or in their gold content within minable depths" is highly significant.

Mineralization on Proserpine mountain consists essentially of pyrite, arsenopyrite, and galena. Galena on the *Independence* group at one point appeared to exist in nodular form in

the quartz. A sample of galena from this property assayed: Gold, 0.45 oz.; silver, 52.5 oz. to the ton; lead, 76 per cent. Gold values are of course of predominant importance. No milling operations at Barkerville have been carried out in the light of modern milling knowledge. There is no suggestion in the appearance of the ore that any difficulties are likely to be met with in connection with milling when the time comes to consider that.

Rainbow Group. This group consists of three claims owned by A. W. Sanders and is situated on Cow mountain at an elevation of 4,650 feet, a short distance west of Lowhee creek. On this property occur a number of veins striking north-easterly across the bedding-planes of the schists; bedded quartz veins are also in evidence. At one place within an area of about 200 square feet there is virtually a "stockwork" formed of a number of these small north-easterly striking veins of Dr. Uglow's "B" class and their intersections with bedded quartz veins or lenses of the "A" class. Within this area very high values in gold occur in places. During the past season it is interesting to note that the owner obtained by panning the roughly crushed quartz and adjacent schist country-rock some very coarse gold, strictly comparable in point of size with the ordinary run of placer gold obtained in the district. This is the first instance, it is believed, in Barkerville of any material amount of gold obtained from a vein comparing in size with placer gold and must convince the most sceptical as to the source of the latter. The fortunate owner of this property, by merely roughly crushing the quartz from his property and the immediately adjacent country-rock and panning, is able to pan out each year a substantial amount of gold, varying from several hundred dollars to $2,000 in value. It must be evident that such is a surface enrichment, but it is equally evident that the total gold contents of the portion of the veins forming the "stockwork" referred to and lying close to the surface is likely to be quite considerable. Only development can enable an opinion to be formed as to the gold content of the primary sulphides. The upper portion of certain areas might be mined by an application of the "glory-hole" system, but it remains entirely to be ascertained by systematic sampling of defined areas, followed by preliminary sinking to get evidence of the depth to which values extend, whether values in a defined block are high enough to warrant such an application. Clearly surface values invite and warrant development. Further particulars of this property will be found in the Annual Report for 1924.

Myrtle Group. This group, situated on Barkerville mountain at an elevation of 5,150 feet, is owned by E. E. Armstrong. An account of it will be found in the Annual Report for 1924 and the information given need not be repeated. Development subsequently has consisted of exposing additional parallel veins by surface-trenching (and it is quite possible, even probable, that other veins are to be found) and sinking on one vein. The shaft was full of water at the time of inspection, but it is stated that it was sunk to a depth of 30 feet and a drift was run from the bottom of the shaft for a distance of 60 feet, exposing a vein having an average width of 2½ feet, showing practically only sulphides, which carried good gold values. The reason given by the owner for stopping was that the Ross mill, equipped with amalgamating-plates and which he was using to treat the oxidized surface ores, was not satisfactory for this sulphide ore. In the case of Barkerville veins only a small amount of oxidized quartz containing gold amenable to amalgamation is to be expected. It is also highly probable that the gold within the sulphides, while not "free-milling" in the sense that it can be readily amalgamated, is nevertheless "free" in the sense that by fine grinding a large portion can be recovered by tabling, although such gold will not amalgamate. In practice the products of such tabling are three—a concentrate containing very high gold values, a concentrate mainly sulphides but still containing good gold values, and a tailing which falls to treatment by some further process. So far as it is possible to form an opinion from the described results of recent sinking and drifting on this property, it indicates that a short distance below the surface sulphides only carrying good gold values were encountered.

This property has points of similarity to the *Rainbow* group and clearly merits further development.

Cunningham Creek.

Two properties, the *Hudson* group and the *Homestake* group, are situated at the head of the South fork of Cunningham creek. They are distant about 20 and 18 miles respectively from Barkerville. The first 12 miles from the latter place is wagon-road and the remainder of the distance is trail.

Hudson Group. This group, owned by E. Moore and associates, is situated on Pearce gulch, a small tributary of Cunningham creek at the head of the latter. Between points having elevations of 5,555 and 5,700 feet there is exposed by means of open-cuts a wide mineralized zone in the Cariboo schist country-rock. This zone appears to be about 35 feet in width and shows alternating bands of quartz and schist. The quartz, as far as can be determined from exposures, strikes N. 25° W. (mag.), dipping easterly. The strike of the country-rock planes of schistosity is N. 75° W. (mag.). The quartz is mineralized with pyrite and galena. A tunnel run at 5,555 feet elevation was caved at the time of inspection and access to this working was not possible. Above this tunnel the Pearce Gulch slope rises at an angle of about 30° to the summit, at an elevation of 5,700 feet between this slope and Harvey Creek slope. Between tunnel and summit there are various open-cuts and the strike of the quartz is such that it can be followed by drifting. Over the summit on the Harvey Creek slope, at an elevation of 5,680 feet, there is exposed a width of 30 feet of alternating bands of quartz and schist, the strike of which, as far as can be judged, is more easterly than that of the Pearce Gulch slope.

A sample taken across a width of 4 feet 6 inches of quartz at an elevation of 5,580 feet assayed: Gold, 0.30 oz.; silver, 0.7 oz. to the ton. This quartz showed a slight mineralization of pyrite, but little galena. A sample taken of pieces of galena from the dump, resulting from driving the tunnel mentioned, assayed: Gold, 2.24 oz.; silver, 5.5 oz. to the ton; lead, 32 per cent. It is evident that the galena in this region is auriferous, and for that reason appears to be the mineral to look for. It is quite possible, of course, that the mineralized zone is wider than 35 feet. The tunnel appears to have encountered a considerable amount of galena, and for that reason, and also because its horizon is well chosen, it would appear advisable for the owners to clean out the cave and drive it ahead. There appears to be in this area a large amount of mineralized quartz.

Homestake Group. This group consists of four claims owned by J. H. Campbell and J. P. Delhanty and is situated some 2 to 3 miles down Cunningham creek from the *Hudson* group. Showings are on the banks of the creek. At an elevation of 4,930 feet there is exposed on both sides of the creek a broad mineralized zone about 30 feet in width striking parallel with the schist country-rock—that is, north-westerly—and dipping at about 65° north-easterly. On the west side of the creek the schists contain a band of limestone, the full width of which is indeterminate from the exposure, but which seems to be not less than 4 or 5 feet, possibly more. In this lime there is exposed at one point a width of 4 feet of solid sulphides of galena, pyrrhotite, and zinc-blende—quite an impressive showing and evidently a replacement deposit of the lime by the mineralization mentioned. Unfortunately, samples only indicate very low precious-metal values. A sample across the 4 feet assayed: Gold, trace; silver, 9 oz. to the ton; lead, 32 per cent.; zinc, 1 per cent. At another point a sample taken across 2 feet assayed: Gold, trace; silver, 5.5 oz. to the ton; lead, 24 per cent.; zinc, 8 per cent. On the east side of the creek mineralization is not so heavy and only about a foot of the mixed sulphides is exposed.

About 300 feet down-stream, that is north of the above mineralization, there is exposed some quartz showing a noticeable amount of galena and pyrite, striking in the same direction. A sample of the most heavily mineralized portion was taken primarily with a view to ascertain the grade of the sulphides in precious metals. The sample assayed: Gold, trace; silver, 1.4 oz. to the ton; lead, 0.5 per cent. While the sulphides exposed above this point are indicative of deep-seated origin, and therefore do not indicate likelihood of any sudden change in silver content in a downward direction, the owners should strip this on the surface, following it up northerly. The bank of the creek is somewhat flat for a short distance away from the creek and ground-sluicing as contemplated by the owners may accomplish a great deal in stripping the surface.

At a point some 450 feet above the first exposure mentioned there is another wide mineralized bedded zone. Very little galena shows at this point, mineralization being mainly pyrite and siderite in quartz. A sample taken at the most promising point across 5 feet assayed: Gold, 0.28 oz.; silver, 0.1 oz. to the ton.

Cariboo Mountain.

A valuable discovery of gold-bearing quartz on Cariboo mountain having been reported, a trip was made to that mountain from Stanley (elevation 3,800 feet), a distance by trail of some 21 miles. From Stanley the trail leads over the pass (elevation 4,715 feet) between Van Winkle

mountain and Campbell mountain; thence follows down the east side of Fountain creek to Williams Cabin, at which point it turns sharply eastward, crossing the Little Swift river at an elevation of 3,490 feet, and thence to a trapper's cabin on Swift river at an elevation of 3,515 feet. This point is 16 miles distant from Stanley. From here the trail leads up the north-western slope of Cariboo mountain a distance of 3 miles. For the remaining distance of 2 miles to the summit, at an elevation of 6,240 feet, there is no trail. The actual summit is fairly flat and roughly oval-shaped, the major axis of the oval having a direction of approximately east and west.

On the northern edge of the summit, extending for at least 1,000 feet in an east-and-west direction, a wide quartz vein from 9 to 16 feet in width stands out prominently, in places 10 feet above the enclosing micaceous-schist country-rock, forming a very obvious feature of the landscape. The vein strikes N. 60° E. (mag.), whereas the planes of schistosity of the country-rock strike N. 35° W. (mag.); the dip is slightly southerly. The quartz shows but little sign of oxidation of the surface. An open-cut (the only working observed) exposes a width of 16 feet of somewhat oxidized quartz. A sample taken across this width showed no gold or silver values. Another sample taken about 500 feet east of this point across 9 feet showed only traces of gold and silver. A third sample taken from the most promising oxidized portions of the vein also showed only traces of gold and silver.

The claims staked on this vein are owned by Messrs. Williams and Thomas, of Stanley. Neither was present during the inspection. Samples taken do not invite development. It is possible that some signs of sulphides might be found by putting a few shots in the bottom of the open-cut mentioned, or, at any rate, signs of increasing oxidation which might be considered hopeful. Unless they have found some point offering greater promise than that mentioned, the owners might be well advised to do a little work in the direction named.

If from the point of view of values the vein is disappointing, it is of geological interest, inasmuch as the exposed southern or hanging-wall surface preserves very perfect glacial striæ and affords most striking proof of the fact that the glaciers overrode the highest mountains. Striæ indicate an ice-movement from east to west.

It might be added that two intrusions of diorite occur on the mountain, forming two knolls on the summit. It is suggested that the owners of the claims might, besides doing a little work at the open-cut mentioned, investigate the vein at its most easterly point of exposure, which is the nearest point to the contact of the diorite mentioned with the schists. At the same time it might be noted that a sample taken at this point showed only traces of gold and silver. A perhaps favourable feature of the vein is that it cuts across the country-rock formation.

This vein is marked on Bowman's map of the Cariboo District; consequently its existence has been known for a great many years.

FORT GEORGE SECTION.

During the summer some excitement was caused at outside points by reports of the discovery of large bodies of quartz in the vicinity of Prince George carrying gold values. The scene of the excitement is what is known as *Six Mile Goldfields*, between 5-Mile and 6-Mile creeks, which flow into the Fraser river on the east side of the latter.

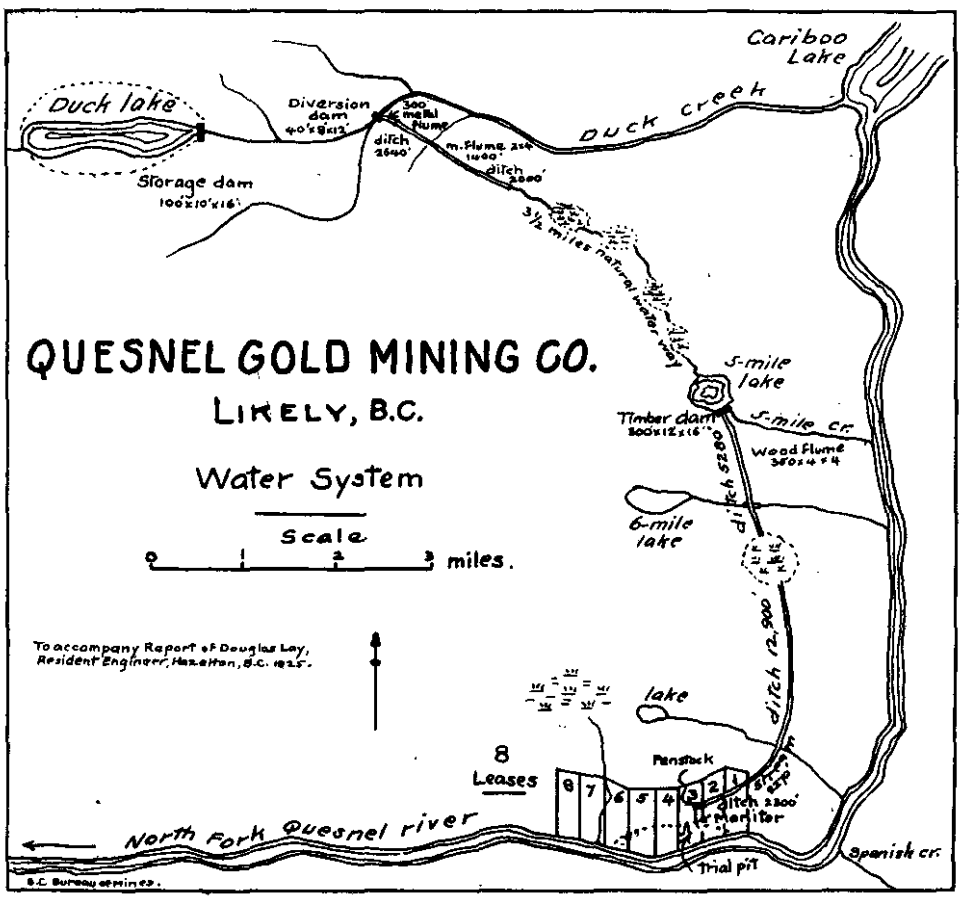
Inspection was made by canoe from Prince George. The deposit in question is evidently of glacial origin and may perhaps be described as a "granitic sand," partially indurated. It occurs on both sides of the Fraser river, which evidently cuts through it. Just how far inland from the banks of the river the deposit extends was not ascertained. The bed of 6-Mile creek runs over a more indurated form of the deposit than that which is to be seen on both sides of the river opposite 5-Mile creek and on the east side of the river by 6-Mile creek, at which latter point the banks of the deposit are some 80 feet high, overlain by a thickness of about 10 feet of more recent gravel. Obviously at this point the deposit extends some distance inland. At 5-Mile creek, while the banks are not so high, it extends right up to grass-roots and is not overlain by gravel. The deposit consists of particles, angular and slightly subangular, of what appears to be a granitic rock, the size of the particles varying from sand to pieces about 1 inch or more. As mentioned, it is partially indurated. It is quite unoxidized.

The owners of the *Six Mile Goldfields* group, consisting of eight claims, are T. Rush, W. Cheer, W. Bonner, and T. Ramage, the claims being situated between 5-Mile and 6-Mile creeks on the east side of the Fraser river. The owners state that they have obtained assays of

samples taken at various points of the deposit varying from mere traces to quite high assays. At first sight it would appear that in the case of a deposit of this kind only free gold could be expected. Examination with a glass, however, showed a particle of quartz containing sulphides. Such particles might account for the existence of combined gold and might explain any wide variation in assays.

At the time of inspection W. Cheer was working at 5-Mile creek, at which point a rocker was being used. An amalgamating-barrel had also been set up and cyanide tests were in progress.

Samples were taken on both sides of the Fraser river. On the west side of the river, of two samples, one showed no values and the other a trace of gold. On the east side of the river one sample taken on the north side of 5-Mile creek showed a trace of gold. Another sample taken on the south side of 5-Mile creek showed no values. The writer panned several samples on both sides of 5-Mile creek, but could find no free gold. There can be no question as to there being an immense quantity of the material described available, but proof is lacking as to the existence of any commercial values.



QUESNEL MINING DIVISION.

So far as production is concerned, mining activity in the Quesnel Mining Division centres entirely in placer-mining, although discoveries this year of auriferous quartz on Yanks peak justify the hope that developments in lode-mining will take place in the near future.

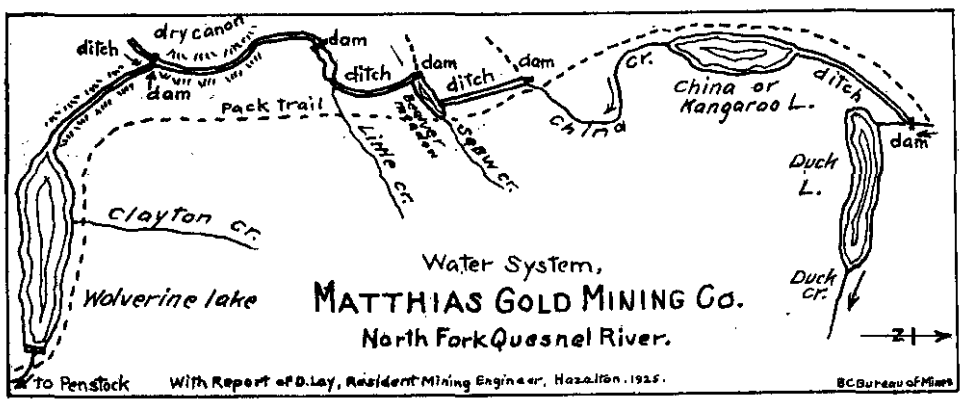
As yet, operating companies are concerned mainly with hydraulic operations. Of these, the *Kitchener* mine on Keithley creek, under the management of K. C. Laylander, was operated with a force of thirty-five men all season, save that dry weather hampered work for about six weeks.

The Cedar Creek Mining Company was inactive during the first part of the year, but at the end of August, B. Boe resumed operations, carrying on drift-mining and the "pump hydraulic" system installed last year, employing a force of thirty-five men. It is proposel to further increase this force in 1926.

The Quesnel Gold Mining Company and the Matthias Gold Mining Company on the North fork of the Quesnel river carried on construction-work, putting their respective water systems in order, to ensure, as far as possible, uninterrupted piping during the 1926 season.

Besides these, a large number of small-scale operators—that is, prospectors—displayed great energy and resource at widely separated points of the district. In the majority of cases they were severely handicapped through lack of means, which has prevented either getting water on the ground for sluicing or else sinking through wet ground to bed-rock.

Keystone-drilling operations were carried on to a limited extent on the South fork of the Quesnel river by the Caribou-Quesnel Syndicate, of Edmonton, at a point near Quesnel Forks, and at Keithley Creek delta by J. M. Davidson on ground controlled by L. A. Bonner. It is understood that drilling is also contemplated at the *Kitchener* mine this winter and in the spring of 1926 by J. B. Twiss and associates at Twin lakes, near Big lake. A considerable amount of ground was staked on both sides of the Fraser river near Alexandria and Macalister.



In lode-mining reference has already been made to the discoveries on Yanks peak, which are particularly described under "Keithley section." Some attention also centred on certain copper-showings above Marguerite and Macalister, on the Pacific Great Eastern Railway. There was also a certain amount of prospecting for lode minerals in various parts of the district.

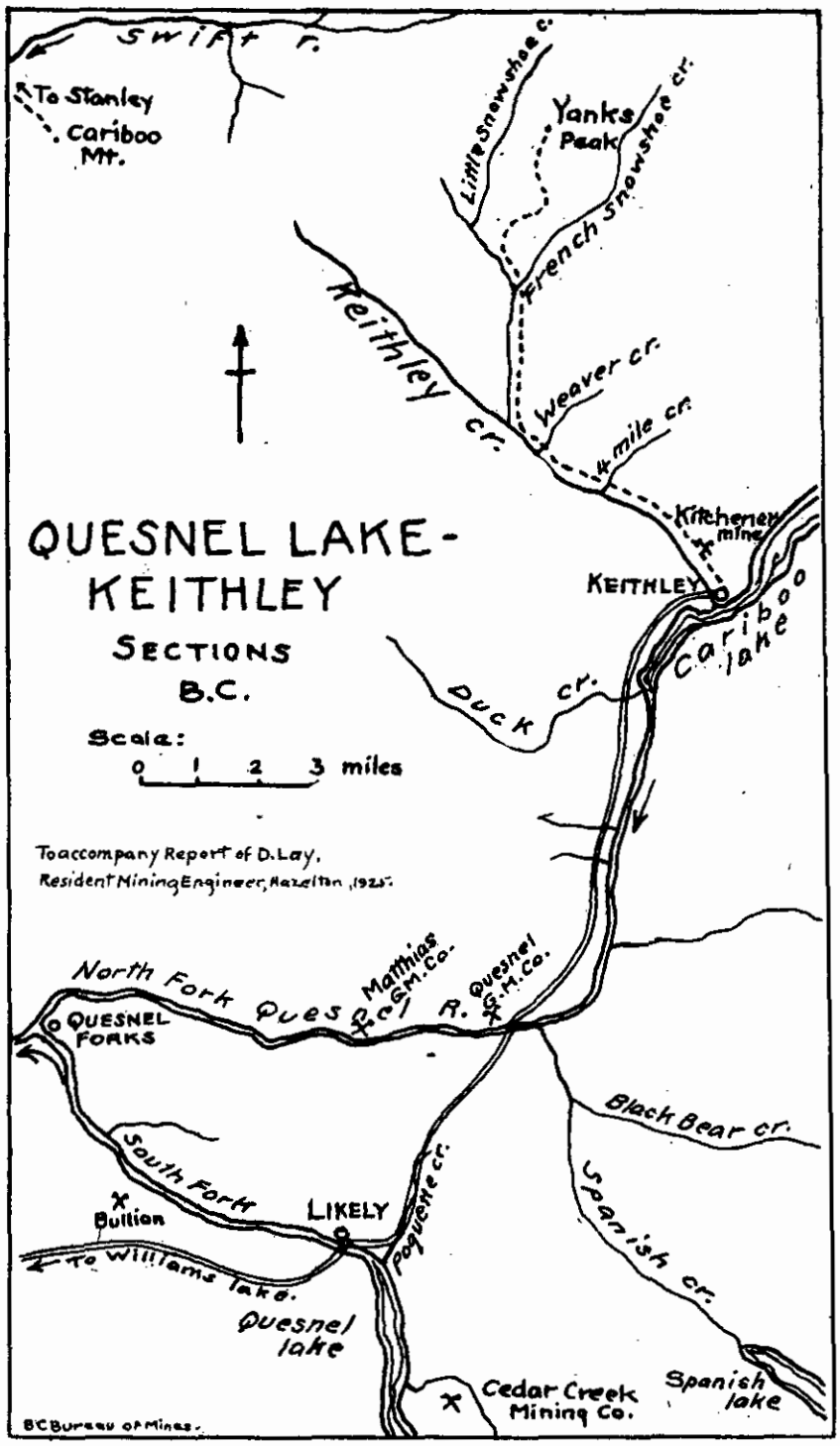
Sight should not be lost of the fact that what is believed to be the largest and purest deposit of diatomaceous earth in the Dominion occurs in immediate proximity to Quesnel, the terminus of the Pacific Great Eastern Railway. This is fully described by V. I. Eardley-Wilmot, of the Mines Branch of Canada, in the bulletin entitled "Investigations of Mineral Resources and the Mining Industry, 1923." The deposit is also described in Memoir 118 of the Geological Survey, Canada, by Leopold Reinecke. It is to be hoped that some development may take place.

Substantial aid was given by the Department of Mines in connection with roads and trails throughout this Mining Division.

QUESNEL SECTION.

Cariboo Gold-Platinum Extracting Company.

This company was organized in 1918. The president and general manager is S. J. Marsh, of Quesnel. The company owns certain leases on the Quesnel and Fraser rivers and also the Canadian patent rights of the "Marsh Process" for the extraction of gold, platinum, and other values from black sands. The primary objects of the company are the application of the "Marsh Process" to its own leases and also the treatment of black sands on a custom basis at a centrally located plant at Quesnel. Owing to lack of funds, operations have been virtually suspended for the past two years and it has not been possible to complete the plant. The present position is that, while excellent buildings have been erected on 2-Mile flat, on the east bank of the Fraser river, about 1½ miles from Quesnel, and certain machinery is on the ground, no actual metal-


Swift R.
To Stanley
Cariboo
Mt.
Little Snowshoe c.
Yanks
Peak
French Snowshoe cr.
Keithley cr.
Weaver cr.
4 mile cr.
Kitchener mine
QUESNEL LAKE-
KEITHLEY
SECTIONS
B.C.
Scale:
0 1 2 3 miles
To accompany Report of D. Lay,
Resident Mining Engineer, Hazelton, 1925.
KEITHLEY
Cariboo lake
Duck cr.
North Fork Quesnel R.
Matthias G.M.Co.
Quesnel G.M.Co.
QUESNEL FORKS
Black Bear cr.
South Fork
Bullion
LIKELY
Poquette cr.
Spanish cr.
To Williams lake.
Quesnel lake
Cedar Creek Mining Co.
Spanish lake
BC Bureau of Mines.

lurgical operations have been carried out in this plant. The writer was shown over this plant by J. D. Boulding, the company's assayer, who has been engaged in analytical work during the year, the assay office and laboratory being equipped.

The plant as constructed consists of the following: A complete and well equipped assay office and laboratory, 28 by 40 feet, with concrete floors; a three-floor "extraction plant" with concrete floors and retaining-walls, each floor about 16 by 16 feet; a two-story office building, interior not quite finished; a small building to serve as a kitchen. All buildings are on concrete foundations and generally of excellent construction. There is also on the ground a 9- by 3-foot Marathon rod-mill, a small 5-foot by 12-inch rod-mill, a boiler and steam-engine, a 50-horse-power oil-engine, and sundry small machinery.

At the annual meeting of the company held in Quesnel on November 24th, 1925, the president presented his annual report, giving an explanation of unforeseen financial difficulties met with and a forecast of plans for the coming year, which comprised, briefly, completion of plant at Quesnel and installation of plant on the placer holdings of the company, the plant comprising "drag-line skimming plants."

Unfortunately, owing to the absence of the president on the business of the company, it was not possible to inspect the company's placer holdings.

The outcome of this company's operations will be awaited with interest. It is well, however, not to confuse or overexaggerate the importance of the issue. The most important sources of platinum do not necessitate the intervention of any process to recover the platinum, such occurring in comparatively coarse form, so that it is readily recoverable by the ordinary gravity methods so widely known.

As a matter of interest it might be mentioned that the General Development Company, of New York, closely associated with the important platinum-dredging operations in Colombia, supplies the following information concerning Colombia occurrences of platinum: "The platinum occurs in coarse flakes and is easily recovered by the ordinary methods employed on gold-dredges, and consequently it has been unnecessary for us to develop any methods which are not well known to every one interested in gold-dredging."

LODE-MINING.

Copper-showings above Marguerite and Macalister, near Cuisson Lake.—Marguerite is a small settlement on the Pacific Great Eastern Railway 36 miles south of Quesnel; Macalister is 4 miles farther south. The elevation of these places is 1,600 feet. The ground rises sharply east of and behind the railway to an elevated plateau-like surface at 2,800 feet, which is several miles wide and parallels the railway for some considerable distance north and south of Marguerite. This level stretch of country contains a succession of natural meadows formed by the agency of beavers and a number of small lakes and forms valuable agricultural land, being devoted mainly to sheep and cattle raising.

Cuisson lake is situated close to the base of the flat-topped mountains, which rise behind the level strip to elevations of not much more than 4,000 feet and in which occur the copper-showings mentioned. A number of claims were examined, of which there are two distinct groups in different country-rock, and the two groups are about 5 miles apart. Each group has its own particular most convenient road from the railway, the more northerly group using a road from Marguerite and the more southerly a road from Macalister. The more northerly group, consisting of *Pollyanna* and adjoining claims, will be described first.

Pollyanna. This group and adjoining claims lie due east from Marguerite, from which place a wagon-road leads a distance of 3 miles to the top of the plateau; thence a sleigh-road leads across the plateau a further 4 miles to H. B. Hill's ranch, situated at the foot of the mountains and from this point a trail leads a further 3 miles up the mountains. The showings on three claims only call for comment; one or two more were seen, but signs of mineralization were feeble. It is stated that T. H. Jackson holds or held forty claims in this region, either under option or in virtue of ownership by himself and associates.

The *Pollyanna* is owned by J. F. and H. B. Hill and shows by far the best surface mineralization. At an elevation of 3,900 feet there is a wide zone of shearing in granodiorite at least 60 feet in width and possibly wider. The width mentioned is exposed by open-cuts. Much of this width is stained with malachite and azurite. A trench about 8 feet deep, partially filled with water, discloses a body of quartz about 15 feet wide and striking approximately N. 60° W. (mag.). Owing to water the exposure itself could not be sampled, but a sample taken from the near-by

dump, which might fairly be representative of the width mentioned, assayed: Gold, trace; silver, trace; copper, 3.5 per cent. Copper minerals present are azurite, malachite, and chalcopyrite.

Manderfield's Claim.

This claim, the name of which is unknown, lies in a northerly direction from the *Pollyanna* and is distant from it about 1,000 feet. At approximately the same elevation a wide zone of sheared granodiorite occurs, possibly 50 feet in width. On the west side of this zone is a quartz vein upwards of 20 feet in width, stained with copper minerals and showing some chalcopyrite. Mineralization over the whole is not by any means heavy. A shaft, it is stated, was sunk here but it had been filled in again. About 25 feet south of the filled-in shaft another shaft, said to be 25 feet in depth, was full of water. A sample was taken of the most heavily mineralized pieces of ore lying on the dump by the shaft. This assayed: Gold, trace; silver, 0.6 oz. to the ton; copper, 2.5 per cent. What width this represented it is not possible to say. The strike appeared to be slightly west of north (mag.).

Conway.

This claim lies about 1,200 feet in a north-westerly direction from Manderfield's claim. A shaft at an elevation of 3,835 feet was also full of water. The quartz here is much narrower than at more southerly points. A width of 2 feet near the collar of shaft showed copper-stains and chalcopyrite. A sample was taken of picked pieces lying on the dump. This assayed: Gold, trace; silver, trace; copper, 2.5 per cent. It is regrettable that gold and silver values are not worth consideration, and clearly copper values do not offer much encouragement, especially in view of the fact that the topography in the vicinity is flat, necessitating sinking.

The showing on the *Pollyanna* is markedly stronger than at other points, and the owners, who are ranchers in the vicinity, might be well advised to sink a little. There is, if anything, an indication that mineralization weakens in a northerly directon; therefore it is suggested that the owners might prospect the surface in a southerly direction, and more especially to look for the contact of the granodiorite with the volcanic rocks. The latter are known to exist about 5 miles in a southerly direction; consequently it should not be difficult to find the contact.

In addition to the above, two more claims, *Arctic* and *Laughing Water*, were inspected in this vicinity. They are south-west of the *Pollyanna* possibly 2 miles and are situated close to H. B. Hill's ranch at the base of the mountain. On the *Laughing Water* an open-cut in sheared granodiorite exposes a small quartz-seam showing copper-stains and chalcopyrite. A sample assayed 0.2 per cent. copper, with no gold or silver values. On the *Arctic* a width of between 9 and 12 inches of quartz striking N. 80° W. (mag.) showed copper-stains and chalcopyrite. A sample assayed 3 per cent copper, with no gold or silver values.

Dowling and McHugo.

These claims are situated some 5 miles south of the *Pollyanna*. A wagon-road from Macalister leads a distance of 9 miles to within 1½ miles of the claims and a trail leads from the wagon-road to the claims. On the *Last Chance* claim there is exposed by an open-cut and small shaft at an elevation of 3,400 feet a mineralization of mainly micaceous iron, with a little chalcopyrite, malachite, and azurite, at the contact of rhyolite and schistose andesite. The contact of these two volcanics appears to strike N. 45° E. (mag.). The width of the mineralization is 2½ feet on the east side of the winze and 1 foot on the west side. A sample across the 2 feet 6 inches assayed: Gold, trace; silver, 0.2 oz. to the ton; copper, 0.5 per cent.

On the *Iron Mask* claim, at a distance of about 2,500 feet in a south-westerly direction from the last-mentioned exposure and at the same elevation, there is another contact mineralization of the same character, somewhat wider, also at the contact of rhyolite and schistose andesite. Exposure in this case is by open-cut and a width of 4 feet of mainly micaceous iron shows, with slight copper-stains. A sample of this assayed 0.2 per cent. copper, with no gold or silver values. On the same property, distant from the last-mentioned point about 1,500 feet south-westerly, a slight mineralization of pyrite and copper-stains shows at the same volcanic contact. There is unfortunately nothing very encouraging about the properties of Messrs. Dowling and McHugo. The region to the north must contain the contact of the granodiorite with the volcanics, and it is suggested that it may be of greater promise.

LIKELY SECTION.

The term "Likely section" is used to designate the country adjacent to Quesnel lake and the North and South forks of the Quesnel river and their tributaries. It includes Cedar Creek camp. The supply-point is mainly the town of Likely, although a few prospectors near the

junction of the forks of the Quesnel river find it more convenient to make Quesnel Forks their headquarters. It is well to point out that "Likely" and "Quesnel Dam" are one and the same place. The former is the post-office address and the latter is the telegraphic address.

Black Bear Creek.

It is well to note that there is reason to believe that Spanish creek was unproductive above the junction with it of Black Bear creek; hence the latter offers promise.

On the upper portion of the creek Messrs. A. Sutherland, Morrison, Muir, Hanson, Johnson, Brimmer, Owens, Dobson, and Bagshawe are carrying on drifting in rim-gravels and intend working during the winter getting out a dump to wash in the spring of 1926. At the mouth of the creek Messrs. H. McGregor and Burns were working during the season on their leases, and also report that there are some quartz veins showing galena on their property. Time did not permit of inspection.

Spanish Mountain.

The following have placer claims on the lower slopes of Spanish mountain, prospecting for "high runs":—

J. Lyne.—J. Lyne has a bench lease at an elevation of 3,260 feet. The groundwork comprises four dry gulches. Gravels are exposed by cuts, but the owner is severely handicapped by lack of water. Gold is very coarse and nuggety and is recovered mainly by rocking, except when spring freshet permits of ground-sluicing.

Oliver & McDiarmid.—T. Oliver and N. McDiarmid have a lease adjoining and immediately above that of J. Lyne. Their lease was not inspected, but an account of it will be found in the 1924 Annual Report. The owners claim that they have proved a channel of about 60 feet for a length of 1,500 feet, with an average depth of gravels of 17 feet, and average values from 45 to 60 cents a yard.

The above properties are about 6 miles from the town of Likely. A road leads from the latter place to Spanish lake and a trail from this road leads to the properties. The lower end of J. Lyne's lease is right on this road.

North Fork of Quesnel River.

On the north side of the river there are two companies operating.

Quesnel Gold Mining Co.—This company is operating eight leases down-stream from the mouth of Spanish creek. The manager is John A. Hatton. After piping out a trial pit some 200 feet long, 20 feet in width, and 8 to 20 feet in depth, constituting a cross-section of the ground at this point, it was decided that values recovered were satisfactory but that the water-supply was totally inadequate for requirements. Accordingly, water rights having been acquired, the company proceeded to render the Duck Creek drainage area available.

This involved building a storage-dam on Duck lake 100 feet long by 12 feet high by 16 feet thick, a diversion-dam on Duck creek 40 feet long by 8 feet high by 12 feet wide, a storage-dam on 5-Mile lake 312 feet in length by 5 feet deep by 16 feet wide, and the construction of 23,440 feet of ditch-line, 1,700 feet of 2- by 4-foot metal flume and 530 feet of 4- by 4-foot wood flume. All of this work was accomplished during 1925, with the exception of the Duck Creek dam and Duck Lake dam and installation of metal flume. It is the intention to keep three men at work all this winter with a view to finish the water system by April, 1926. When completed it is estimated that water will be sufficient for continuous work from April to October.

Matthias Gold Mining Co.—This company is incorporated under the laws of the State of Washington and capitalized at $300,000, and is also incorporated as a private company in British Columbia. The head office is at Bellingham, Wash. This company owns eight leases adjoining and on the west of the leases of the Quesnel Gold Mining Company.

The ground consists of river bench-gravels. Operations this season were in the nature of preliminary work in connection with the water system to ensure as far as possible an uninterrupted hydraulic run next season, followed by the opening-up of a trial pit, in the nature of a cross-section, to afford an approximate idea of values.

Preliminary work accomplished consisted in getting hydraulic supplies on the ground; building a branch road from main Likely–Keithley road, also various trails; constructing about

8,000 feet of ditch, various diversion-dams, and one storage-dam on Wolverine lake; putting in penstock, laying pipe, and setting up monitor.

A trial pit was opened up and a tailings-flume put in down to bed-rock, and at a very rough estimate about 40,000 yards of gravel was piped off. Unfortunately the water-supply failed before the pit could be cleaned. At the time of inspection piping had been suspended for the season. Bench deposits such as this, although richer on bed-rock than elsewhere, cannot be expected to contain high average values. It is regarded as important that this company should clean up this trial pit in the spring. The dimensions of the pit can be readily ascertained with some degree of accuracy and thus some idea, at any rate, will be formed of average values. It is not to be inferred, of course, that the data so obtained will apply to the whole of the holdings, but the information gained, studied in conjunction with the results of any other testing that may have been carried out, will be a valuable guide.

The head of water at the nozzle is 200 feet, which is excellent. The writer is not in a position to speak from first-hand information as to the adequacy of the water-supply. Dumping facilities are excellent, and, moreover, the flume is down to bed-rock, so that maximum recovery of gold is assured. Given an adequate supply of water, this company appears to be in an excellent position to derive the maximum profit that the ground will yield during the next season.

The manager, Geo. Alexander, states that this company has also purchased a ranch in the vicinity with a view to effect economies by raising home produce. An average number of fifteen men was employed during the year and operations seem generally to have been conducted with energy and economy.

On the south side of the river a number of small operators were at work during the season.

W. Farrel is prospecting a lease lying just below the mouth of Spanish creek.

Murderers' Gulch.—Messrs. Rafferty, Tilten, Macdonald, Day, and Comer have obtained water rights on Poquette creek and Murderers' gulch and intend more active prospecting of their leases than has been possible hitherto. This property was not inspected this year, but an account of it will be found in the 1924 Annual Report.

F. Bendtsen.—F. Bendtsen has a lease just above the old bridge over the North fork on a low bench just a few feet above the present level of the river. Good "pay" was taken from this region in the early days. The owner has done a considerable amount of testing by small trial pits and has formed the opinion that the depth of pay-ground is about 8 feet, the width of the channel about 250 feet, and the length about 800 feet. The false "bed-rock" is either sand, clay, or boulder. Not having any water for ground-sluicing other than that in the river, he this year constructed an undershot water-wheel operated by the current of the river for the purpose of running a "Wonder" pump, delivering water on his property. As the river rises and falls during the season and various other little problems, a proposition of this kind offers greater difficulty than might be at first sight imagined. With the exception of the pump, the installation was made and assembled by F. Bendtsen himself, who showed considerable mechanical skill. Operation of the plant demonstrated that certain mechanical details required adjustment and the owner hopes to effect these next spring and get his plant into successful operation.

Aid was given by the Department of Mines in improving the trail to this property and in constructing a light cableway across the river by the old North Fork bridge, such as to permit of passenger traffic. This should be a great boon to prospectors in this neighbourhood.

W. J. Hill, J. Shaw, and Mrs. Shaw.—These owners have adjoining leases on the river about 3 miles below Bendtsen's lease and about 3½ miles from Quesnel Forks. At the time of inspection work was being carried on at W. J. Hill's lease. Gold here is coarse, but progress is extremely slow, inasmuch as there is only river-water available and this has to be carried up by hand. The gold is recovered by means of a rocker and the owner states that selected portions run about 1 cent to the pan. A small pump installation on this property would doubtless be productive of good results.

Maud Creek.—This creek flows into the Quesnel river about 3 miles below Quesnel Forks from the north. One man, whose name could not be ascertained, is working on this creek by himself and evidently doing very well, as he comes into Quesnel Forks once a month bringing in on an average gold to the value of $100. Time did not permit of inspecting the property. There is no means of crossing the river at this point other than by raft. The cableway referred to as about to be constructed by the North Fork bridge will afford readier access to what appears to be a promising area.

South Fork of Quesnel River.

Rose Gulch.—Messrs. Macdonald and Taylor were engaged all season in prospecting their leases near Rose gulch; they announce themselves satisfied and intend installing a small hydraulic plant in 1926. With that end in view, towards the end of the season they cleared out the road from Likely, which runs on the north side of the river along the base of their property.

Bullion Mine.—The famous *Bullion* mine was the subject of investigation by engineers during the year. The outcome will be awaited with much interest.

Quesnel Lake.—Between Likely and Cedar creek a number of leases are situated on the hillside facing Quesnel lake. W. A. Johnston, of the Geological Survey, in his report of the Cedar Creek area, pointed out that the probable course of the ancient valley extended from the *Stevens* ground (the extremely rich lease of the Cedar Creek area) in a north-westerly direction towards the outlet of the lake by Likely, nearly coinciding with the present course of the lake from Cedar creek to the outlet. And that above the *Stevens* lease the ancient valley probably extended along the west side of the broad upper part of Cedar valley. Attention is drawn to the fact that it is to be regarded as of high importance to drill the supposed channel, which may disclose very important results. Prospectors owning leases within the area mentioned have repeatedly endeavoured to get to bed-rock by sinking, but their efforts have been rendered abortive by water, and the Keystone drill affords the only means of proving the ground. There are a number of prospectors owning leases within the area who have formed an association, the members of which collectively are fully prepared to meet interested capital in a most reasonable way. They are prepared to supply labour free in connection with drilling operations. Should drilling operations warrant mining operations, the capital required would be advanced by those embarking on the enterprise, in exchange for a prearranged share of the leases in question. The prospectors themselves have not the means, of course, to carry out the drilling, still less the means subsequently required should drilling disclose warrant for such expenditure. It is possible for responsible persons, on providing the necessary bond for safe custody, to secure the loan of a Government-owned Keystone drill. The cost of preliminary drilling would therefore be small.

It is further pointed out that the area in question is very readily accessible. A good road connects Likely with Williams Lake, a town on the Pacific Great Eastern Railway, the distance being about 60 miles. There is an excellent auto-stage service tri-weekly between Williams Lake and Likely. A branch road extends from Likely to Cedar Creek camp, a distance of about 5 miles, along the lake-side for about 3 miles, and then up Cedar creek.

It may also be pointed out that there is an excellent source of power near by in Spanish creek. At the head of this creek is Spanish lake and a dam has been constructed at the outlet of the lake. While the dam would need repairs first before any hydro-electric plant could be installed, this is not a very formidable matter. The water rights in question are owned by the Bullion Syndicate, but as they are not at present being utilized, doubtless some satisfactory arrangement could be arrived at whereby, in the event of any developments warranting such, provision of power would be forthcoming.

C. Lackie and J. D. Boyd Leases.—These leases extend on the hillside above the lake about 1½ miles from Likely, Poquette creek being situated at the eastern boundary. At between 50 and 75 feet vertically above the lake shallow gravels occur on the hillside which would seem to be in part, at any rate, Tertiary. Pay-gravels consist of red and blue gravels on bed-rock, which contain much pyrite in the form of crystals, cubic in form. Such Tertiary gravels may not necessarily be in place, but may represent resorting action by glacial streams. At higher points on the hillside a deeper deposit of sand and gravel becomes evident. At about this elevation Poquette creek cuts through gravel-deposits which suggests the possibility that formerly this creek in this upper region may have followed a channel which diverges somewhat sharply to the west. Should that prove to be the case there is likely to be a considerable yardage of gravel on this property. Values and yardage must necessarily remain very largely a matter of conjecture in the present state of development, except in so far as the shallow gravels are concerned. Gravels immediately on bed-rock contain a concentration of values of course, but the upper portions contain some values. C. Lackie states that an estimate of 50 cents a yard would, he considers, be about an average, although gravels on bed-rock contain very much higher values.

No water of any kind, other than surface run-off, occurs on the property, which is another instance of the many where the owners are impeded by lack of funds from working to any

advantage. Water could be secured from Poquette creek for ground-sluicing operations at no great expense. The elevation of the point of proposed diversion on Poquette creek was observed by aneroid to be 2,500 feet. The elevation of Quesnel lake is 2,250 feet and that of Spanish lake 2,975 feet. This property appears to be promising and is very conveniently situated. Two roads cross it—namely, the Likely–Keithley main road and also the branch road from Likely to Cedar creek.

Other Placer Operators.—Between Poquette creek and Cedar creek a number of prospectors worked on leases on the hillside above the lake. Time did not permit of inspection, but from the owners' reports they have found it impossible to reach bed-rock by sinking owing to water. Among these may be mentioned R. T. Morgan, C. Muir, T. Magee, A. Sutherland, and associates. W. S. Harvey also worked on ground in this region. Obviously all the above mentioned require to be studied in connection with the region occupied by the ancient valley previously referred to.

Cedar Creek Camp.

Cedar Creek Mining Co.—This company was inactive during the first part of the year. At the end of August, B. Boe recommenced operations on the company's property with the "pump hydraulic" plant installed last year and also by drift-mining on the *Sheridan* lease.

Acute shortage of water at this property calls for the utmost economy in regard to consumption. A high degree of ingenuity is displayed by the management along these lines, which is reflected both in drifting and pump-hydraulic methods.

On the *Sheridan* lease there are two sets of underground workings which are not connected. The one not in use is employed as an underground water storage. The pump exhaust is run into the sump and heats the water, thus enabling dirt from the mine to be washed during winter. The tailings from sluicing operations pass into a settling-pond and the settled water gravitates back to the sump in the shaft.

During this winter it is the intention to "pump hydraulic" the lower portion of the *Stevens* lease, including the famous "nugget-patch," and then construct a reservoir at the latter point and move the plant up to pipe the remaining portions.

Platt and Lyne Leases.—These leases were operated during the year by E. T. Fitzsimmons, who reports that they did not come up to his expectations.

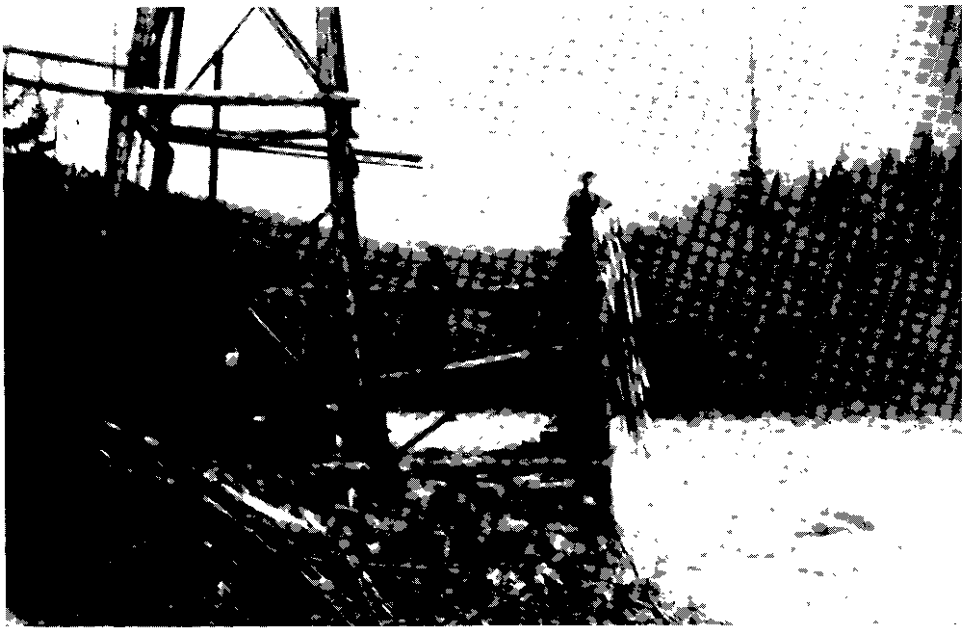
Burns & Philips Drift, Lyne Lease.—A matter of great interest was the starting of a tunnel on the north-eastern part of the *Lyne* lease, at an elevation of 3,000 feet, just at the edge of the Cedar Creek draw, where bed-rock outcrops and the ground falls away sharply. At the time of inspection the tunnel had progressed a distance of 90 feet in glacial drift. The tunnel is in the supposed "Big Channel" and results will be awaited with interest. Messrs. Burns and Philips were driving the tunnel under an arrangement with the owners of the *Lyne* lease.

KEITHLEY SECTION.

A wagon-road some 18 miles in length runs from Likely to Keithley Creek, a settlement at the mouth of the creek. A steep road leads from the main road to the *Kitchener* mine, which is about 2 miles distant from the mouth of the creek.

Kitchener. This mine has been fully described in previous Annual Reports for years 1921, 1922, 1923, and 1924. Operations have been carried on throughout the season with a force of thirty-five men. A dry spell, however, occurred during the summer, lasting for about six weeks. Work this year has been directed to an old pre-glacial channel some 400 feet above the present creek-level on the east bank of the creek. The manager, K. C. Laylander, has been very successful in locating the course of these channels by magnetometric survey methods. An account of the method is given in the 1924 Annual Report. Reference to the sketch therein given will show the channels located. A drift has been started on one of the newly discovered channels and it is proposed to undertake some Keystone-drilling this winter simultaneously with drifting. Drilling is of course necessary to determine the actual values in the channels.

Noteworthy features of this hydraulic mine are the lighting-up of the pit at night by electric search-lights to enable continuous piping to be carried on, and also a small compressor to furnish



Water-wheel on Quesnel River.



Cariboo Mountain Quartz Veins.

air for hammer-drills, which are used to drill the large boulders which are characteristic of this placer deposit. Both compressor and dynamo are of course operated by water-power.

Other Operators.—Among those carrying on small-scale operations may be mentioned: F. L. Delong, on Weaver creek, who has a small hydraulic plant which he operates himself without assistance; T. Mitchell, on the west bank of Keithley creek; and J. Evans, on Main Snowshoe creek.

Yanks Peak.

This mountain was the scene of a recent promising discovery of auriferous quartz. It lies between Little Snowshoe and French Snowshoe creeks, tributaries of Main Snowshoe creek, which latter is a tributary of Keithley creek. The distance to the point of discovery from Keithley Creek Post-office is about 12 miles. The trail is, however, an easy one, the rise in the first 8 miles or so being only 1,200 feet. The trail follows on past the *Kitchener* mine along the east bank of Keithley creek; thence along the east side of Main Snowshoe creek to a point about half-way between French Snowshoe and Little Snowshoe, where it turns in a north-easterly direction up the southern slopes of Yanks peak.

Following upon the original discovery by Messrs. Talbot and Larsen, extensive staking of claims in the neighbouring vicinity took place. A few near-by claims were also inspected.

Yanks Peak Group. This group of three claims is owned by Messrs. Talbot and Larsen and is situated at an elevation of between 5,600 and 5,700 feet on a hillside sloping at about 20°. The claims are located roughly in an east-and-west direction, *Yanks Peak No. 1* being in the centre, *Yanks Peak No. 2* on the west of the latter, and *Yanks Peak No. 3* on the east. The owners were not present at the time of inspection, but H. Hasbrouck, who owns an adjoining claim, accompanied the writer and pointed out places that were known to carry good values. While other exposures occur, those on the *No. 1* claim were pointed out as being the best and therefore attention centred on this claim primarily. The country-rock of Yanks peak is the Cariboo schists. At the summit of the mountain (elevation 6,200 feet) there are, however, two outcrops of quartzite and an extensive development of free quartz.

On *Yanks Peak No. 1* there are four approximately parallel veins of oxidized quartz, about 1½ feet in width and about 25 feet apart. The strike is about N. 25° E. (mag.) with steep southerly dip. Exposures are by means of open-cuts, by a shaft 12 feet deep on one vein, and also by a tunnel 50 feet in length. The tunnel is a considerable distance from the shaft and lowest open-cuts, and as the veins are close together it was difficult to determine with certainty the identity of the various veins at the upper point. The shaft shows an oxidized quartz vein 1½ feet wide at the bottom, a sample of which assayed: Gold, 3.60 oz.; silver, 0.4 oz. to the ton.

Samples were taken from two open-cuts which appeared to be on the same vein, but which were about 250 feet apart. Width sampled in each case was 1½ feet. One sample showed only traces of gold and silver. The other sample assayed: Gold, 3.8 oz.; silver, 0.6 oz. to the ton. The tunnel is a drift and follows for a distance of 50 feet a vein 1½ feet wide. This width shows in the face. The quartz is very much oxidized and shows a little pyrite. A sample across the width of 1½ feet at the face assayed: Gold, 11.2 oz.; silver, 2.8 oz. to the ton.

It might be stated that none of the samples showed any visible gold, nor was any seen at any other point. For that reason the samples were certainly taken without bias. It is stated that the owners panned out several hundred dollars' worth of gold from the claim and it is quite possible that the richest spot was not sampled. These assays are to be considered as most encouraging. While the topography at some points is somewhat flat for tunnels following the vein into the mountain, at other points drifts can be run. The drift which is already in 50 feet appears to be at a fortunate horizon and should obviously be continued. The surrounding conditions in the way of mining facilities are distinctly good. Exposures are just above timber-line, but there is abundance of timber in the near vicinity, likewise abundance of water in the creek at the base of the mountain, somewhat under 2,000 feet below. This property clearly merits development.

Mizpah No. 1. This claim, owned by H. Hasbrouck, is immediately below and south of *Yanks Peak No. 1*. At 5,500 feet elevation there is a quartz vein 4 feet in width striking N. 30° E. (mag.) with a steep southerly dip. A sample on assay showed no values.

Mizpah No. 2. This claim is immediately below *Yanks Peak No. 3.* The owner is Mrs. Hasbrouck. At 5,300 feet elevation a vein of pure quartz striking north and south (mag.) and dipping easterly showed no values on sample taken. This vein shows immense specimens of quartz crystals and has yielded some very beautiful specimens.

Contact. This claim is immediately south of *Yanks Peak No. 2.* It is owned by Messrs. Clark and Walton. At an elevation of 5,400 feet a vein is exposed at one or two points by shallow open-cuts; a little pyrite is noticeable. Samples taken failed to show any values.

Besides the above claims, there are others not on Yanks peak at a lower elevation in a north-easterly direction some 3,000 feet, owned by Messrs. Pickering and Glover. Time did not permit of inspection.

Also F. M. Wells has staked a large number of claims on the assumed continuation of these Yanks Peak veins in a south-westerly direction across Little Snowshoe creek. It is interesting to note that rich placer-ground was found on Little Snowshoe creek, which flows round the western base of Yanks peak.

HORSEFLY SECTION.

It was found quite impossible to visit this section, but no report is to hand of any important developments or activities.

PEACE RIVER MINING DIVISION.

Inspection of the Peace River Mining Division was not made. An account will be found in the 1923 Annual Report.

CENTRAL MINERAL SURVEY DISTRICT (No. 3).

BY H. G. NICHOLS, RESIDENT MINING ENGINEER.

INTRODUCTORY.

The No. 3 or Central Mineral Survey District comprises seven Mining Divisions—namely, Kamloops, Clinton, Lillooet, Ashcroft, Yale, Nicola, and Vernon.

The district covers an area of approximately 4,400 square miles, or, roughly, one-third of the territory of the mainland of Southern British Columbia lying between the 53rd and 49th parallels of north latitude.

The No. 3 District is commonly associated with the Interior Plateau country, but typical plateau conditions are not characteristic of the district as a whole, as may be seen from the accompanying map. On both physiographical and geological grounds the district may be divided into four areas, as follows:—

(1.) The Coastal Mountain area.
(2.) The Southern Interior area.
(3.) The Northern Plateau area.
(4.) The Western Mountain area.

The reasons for this subdivision may be understood from a consideration of characteristic conditions in each of the above-mentioned areas. The Coastal Mountain area covers a section of country in which the predominating feature is the intrusion of the Coast Range batholith. The second area, while it includes some considerable portion of Interior Plateau country, is characterized by geological conditions that differentiate it from the rest of the Interior Plateau region within the district, which is overlain, for the greater part, by extensive lava-flows of recent origin.

In this Southern area there are widespread exposures of rocks that are contemporaneous probably with the Vancouver series, and are intruded by numerous stocks of eruptive rocks which are also probably related to the coastal batholithic intrusion. An outstanding feature in connection with this area is the extensive fissuring and shearing of both the intruded and intrusive rocks and of composite rock complexes intermediately related to both of them, and a widespread mineralization associated with this fissuring.

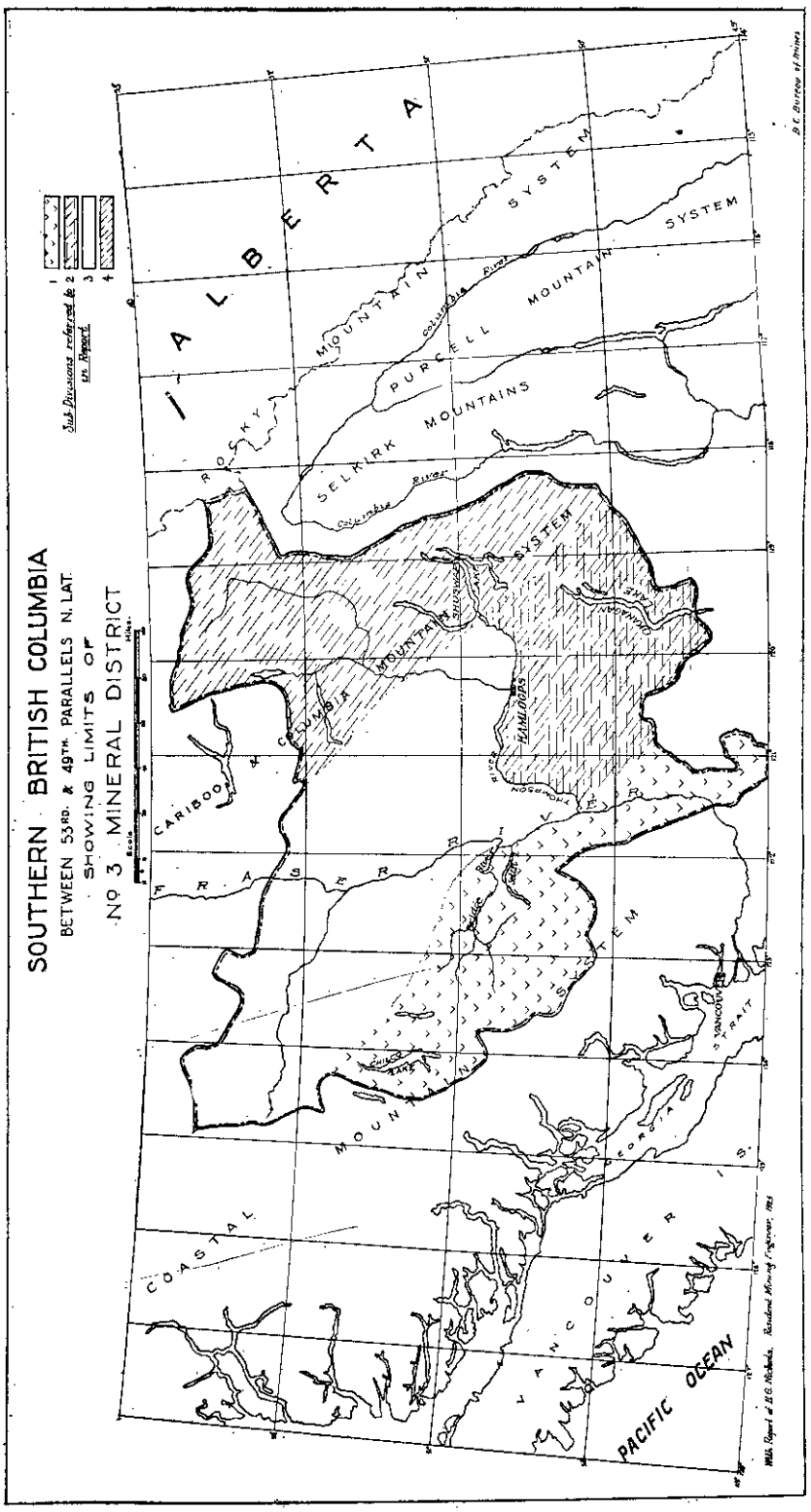
The third area is characteristic Interior Plateau country, with extensive development of Tertiary formations. The fourth area is a part of the physiographical unit that goes under the name of the Cariboo and Columbia Mountain system, and its chief characteristic from a mining point of view is the occurrence of Pre-Cambrian rocks.

It may thus be seen that the actual area to which, in so far as lode-mining is concerned, the less favourable features of Interior Plateau conditions apply covers no more than about 1,400 square miles, or one-third of the total area of the No. 3 District. A recognition of these subdivisions and of the reasons for the classification may be of assistance in prospecting, and, as will be noted below, examples are not wanting in illustration of the possibilities of ore-deposition relative to their respective features.

Commencing with the north-western extremity of the first area, V. Dolmage* has pointed out that almost everywhere, in the vicinity of Chilko lake, along the contact of the Coast Range batholith with the Triassic rocks, there is strong evidence of mineralization. Although no large bodies of commercial ore have yet been discovered, it is highly probable that deposits of the contact-metamorphic type, with copper, zinc, iron, gold, and silver content, may be discovered along the contacts of interbedded bands of limestone with the intrusives.

Passing farther to the south, the country around the headwaters of the Bridge river and its tributaries has been known for many years in connection with quartz veins carrying gold and silver, and it is satisfactory to note that during the past year one of the mines of this class has re-entered the producing stage. The encouragement following upon the development of the *Pioneer* mine has already led to renewed activity in prospecting, and it is probable that as a result the boundaries of the known mineral area in the vicinity of the Bridge river will be

* Geological Survey, Canada, Summary Report, 1924, p. 59 *et seq.*


SOUTHERN BRITISH COLUMBIA
BETWEEN 53RD. & 49TH. PARALLELS N. LAT.
SHOWING LIMITS OF
No 3 MINERAL DISTRICT
Sub Divisions referred to in Report
ALBERTA
ROCKY MOUNTAIN SYSTEM
PURCELL MOUNTAINS
SELKIRK MOUNTAINS
Columbia River
COLUMBIA MOUNTAINS SYSTEM
CARIBOO
KAMLOOPS
FRASER RIVER
COAST MOUNTAINS SYSTEM
COASTAL MOUNTAINS
VANCOUVER I.
PACIFIC OCEAN

extended in the near future. In this connection it may be noted that some interesting discoveries of gold and silver ore have been made during the past year in the Shulaps range of mountains, on the north side of the river and some 16 miles north-east of the Cadwallader Creek deposits.

A promising area lying to the south of the Bridge River country is that around the headwaters of the Tenquille river. Some important developments have occurred within this section during the past year and considerable interest has been aroused by the discovery of a high-grade silver mineral, probably polybasite; and there are several promising occurrences of gold, copper, lead, and zinc ores in the same district, occurring as veins and replacements in shear-zones, in the intruded rocks near the batholithic contacts. Commenting upon this area, C. E. Cairnes* makes statements to the effect that geological conditions are excellent for the accumulation of mineral wealth. There is here an intimate association of intrusive and intruded rocks. The latter include an abundance of limestone strata and were sufficiently sheared and deformed in pre-mineral times to provide convenient channels for the passage of ore-bearing minerals. This mineral-belt appears to extend south-easterly towards Lillooet lake.

Passing farther to the south and into the country adjacent to the Coquihalla valley, it is to be noted that development within this section of the Cascade mountains has been subject to great handicap on the score of inaccessibility and heavy snowfall. The region has hitherto been noted chiefly for the occurrence of gold-bearing ores of which the average content has not generally lived up to the promise of more or less sporadic high-grade shoots, but in regard to one part at least C. Camsell† states in effect that deposits containing copper and gold metals are perhaps the most important and are certainly the most widespread. As an example he cites the *Independence* group at the head of Lawless (Bear) creek, where an ore-body having a width in one place of 90 feet has been formed in a fissured granite porphyry, intrusive between the old Triassic schists and the granite batholith. Within this area, also, are many promising prospects of silver-lead ore on the Coquihalla side of the Tulameen summit.

Passing eastwards to the area that has been described as being characterized by a greatly disturbed country of ancient volcanic rocks intruded by granitic stocks, it is to be mentioned that economic development has suffered from the widespread nature of the mineralization.

The occurrence of copper minerals in the joint-planes of intrusive rocks, and in shear-zones and fissures in a highly altered and disturbed diabase of volcanic origin, is common throughout this area. The low-grade copper-deposits of Highland valley, the copper ore of the *Iron Mask*, and the copper-deposits in the neighbourhood of Merritt may be cited as examples. With so lavish a distribution of mineralization it is not unreasonable to anticipate the discovery of structural conditions which would be favourable to depositions of economic importance, but up to the present time it is to be admitted that, with the sole exception of the *Iron Mask*, the extensive prospecting throughout this area has not met with such reward.

In regard to this part of the country it is to be noted that the relief does not favour development by tunnelling, and capital has not been available for the more costly requirements of shaft-sinking. One of the best instances in which localization of the mineralization in definite fissures affords encouragement for more extended development is to be found in the case of the veins in the Stump Lake area.

Coming to the Western area, of which it has been stated that the principal characteristic is the occurrence of Pre-Cambrian rocks, the significance of this feature may be appreciated when it is remembered that the biggest mine in British Columbia—namely, the *Sullivan*—occurs in a formation of this age. This is not to say that lithological correlation of the rocks within this area, and notably of those of the Shuswap series, with the heavy-bedded quartzites of the Kimberley area, may be assumed to the extent of claiming similar possibilities of mineralization for them, but it does point to possibilities which may be held to differentiate this area from any others within the limits of the No. 3 District.

The country east of Okanagan lake has already attracted attention in connection with the occurrence of silver-lead ore and the production of placer gold; the Shuswap Lake and Adams Lake areas afford many opportunities for prospecting; operations have been renewed at the *Homestake* mine; and a serious attempt is being made to investigate the possibilities of the *Cotton Belt* mines above Seymour arm. Near the borders of this area also are the silver-lead prospects of the Barriere district and the *Windpass* mine; and still farther to the north-west

* Geological Survey, Canada, Summary Report, 1924, p. 75 *et seq.*
† Geological Survey, Canada, Summary Report, 1909, p. 113.

is a long stretch of attractive territory reaching up to the headwaters of the Clearwater river and to the divide between the country drained by the Thompson river and the Cariboo system.

The foregoing notes upon the subdivisions of the No. 3 District are given as an introduction to the recommendations for prospecting which follow.

PROSPECTING.

A comparison between the number of assessments recorded and claims staked during the years 1924 and 1925 is shown in the following table:—

Comparison of Statistics, 1924 and 1925.

Divisions.	Claims recorded.		Certificates of Work.	
	1924.	1925.	1924.	1925.
Kamloops	213	175	262	265
Clinton	184	139	229	102
Lillooet	70	90	101	188
Ashcroft	74	181	86	65
Yale	152	158	160	171
Nicola	46	63	57	71
Vernon	123	123	45	52
Totals	862	929	940	914

The impetus which has been felt throughout the Province as a result of the renewed interest evidenced by investors in its mineral possibilities is reflected in the activity of prospectors in this district. The intention of the Government to aid prospectors in every possible way is amply testified to by the large amount of roads and trails which have been constructed during 1925, as in previous years, and the desire of prospectors to do such work as will justify this co-operation is generally admitted.

In order that the help so afforded by the Government may be productive of the best results, it is desirable that there should be co-operation between prospectors and the Government at the outset; in other words, that guidance should be given to prospectors, whenever possible, in regard to the more favourable fields for their work. The following sections are recommended to prospectors, and those interested in the development of mineral resources, in order of priority:—

(1.) The area adjacent to the Coast Range eruptive, lying south of the headwaters of the Bridge river and extending down to Lillooet lake.

(2.) The area lying to the west of the Fraser river between Hope and Lillooet.

(3.) The Coquihalla River area depicted on the map accompanying C. E. Cairnes's report in Memoir 139, Geological Survey of Canada.

(4.) The area tributary to the North Thompson and Clearwater rivers, north of Chu Chua.

(5.) The Shulaps range, Bridge River district.

(6.) The area east of Okanagan lake to the headwaters of the Shuswap river and its tributaries.

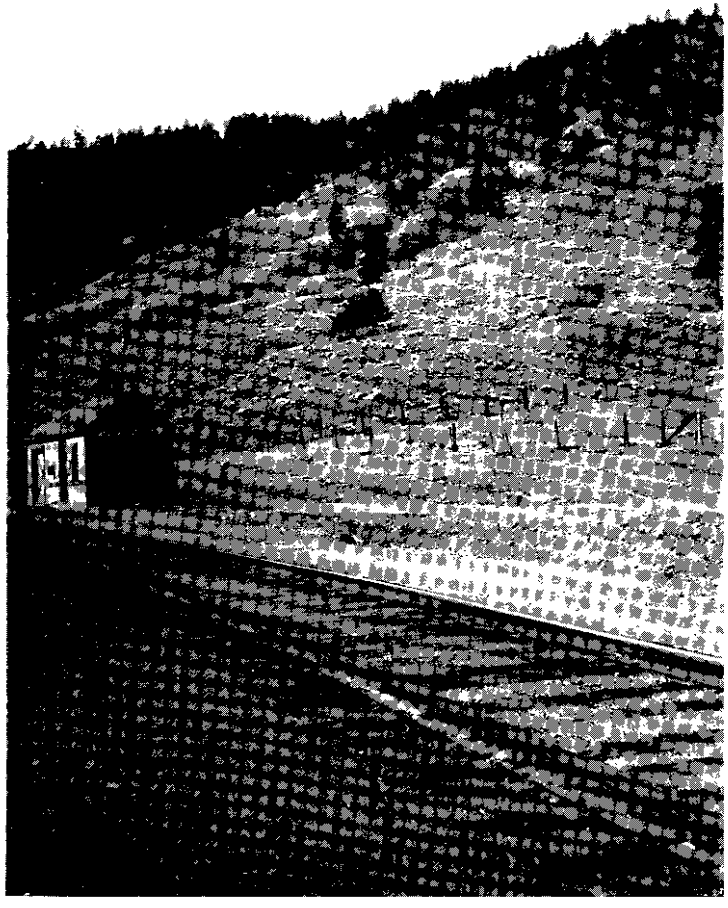
(7.) The area to the north and west of the Shuswap lakes.

SUMMARY.

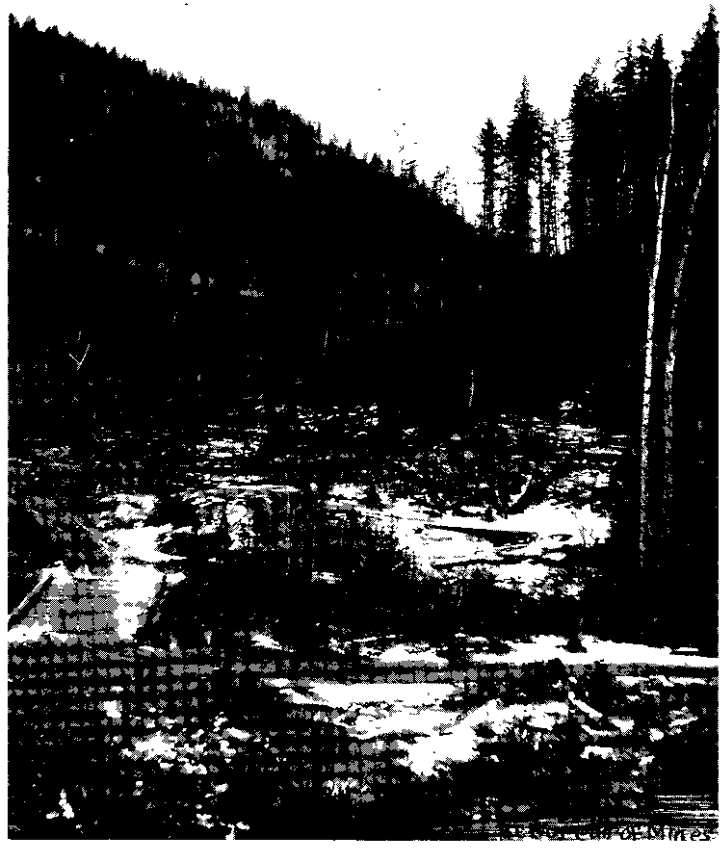
The district offers many opportunities for prospecting, and owing to the variety of geological conditions embraced within it there is wide scope for investigation in relation to the mining of gold, silver, lead, zinc, copper, molybdenum, antimony, arsenic, mercury, coal, and non-metallic minerals.

The district is served by five lines of railway, and access to all sections is provided by an excellent system of roads, from which a continuously increasing number of trails are being constructed to the mining camps and prospects.

During 1925 important strides have been made in the progress of mining. Mines have been reopened and new discoveries have been made; there has been production of gold, silver, copper, lead, zinc, coal, and non-metallics, totalling a value of approximately $100,000, and the



Cinnabar Mine at Copper Creek, Kamloops.



Lemieux Creek, Kamloops M.D.

promise of very considerable increase is borne out by the results of work in mines now under development and by the attitude, which is fully warranted, of investors and prospectors towards this district in general.

The announcement made during the year by the British Columbia Electric Railway Company, of the intentions regarding development of hydro-electric power in the Bridge River section, is of vital importance to mining interests in the Dry Belt, where the promise of a supply of cheap power is likely to be productive of far-reaching results.

PRODUCTION.

The following is a list of the shipping properties in District No. 3 and their outputs for the year 1925:—

Name.	Ore mined.	Gold.	Silver.	Copper.	Lead.	Zinc.
	Tons.	Oz.	Oz.	Lb.	Lb.	Lb.
Pioneer	7,098	3,531	.....	.....	.....	.....
Vimy Ridge	83	.....	59	18,113	.....	.....
Georgia No. 2	1	37	.....	.....	.....	.....
Totals	7,182	3,568	59	18,113	.....	.....

KAMLOOPS MINING DIVISION.

The outstanding feature in this Division is the reopening and further development of the *Windpass*. Other noteworthy activities are in connection with renewed work on the property of the Cotton Belt Mines, Limited, and the *Iron Mask*.

KAMLOOPS SECTION.

Iron Mask. Following upon the exhaustion of the sulphide ore of the *Iron Mask* and *Erin* claims, which was amenable to the methods of treatment by flotation, and upon financial difficulties, operations were suspended in March, 1924, and were resumed, after reorganization, in March, 1925. An extensive programme of development was laid out, including the sinking of another shaft and about 2,000 feet of crosscutting. The purpose of this work was to test the correctness of a theory held by the manager, A. E. Wallinder, of the existence of intersecting ore-bodies lying to the north of the original workings. Some colour seems to be lent to this theory by the mineral occurrences of Coal hill, where this mine is situated. Over an area of approximately 26 square miles there have been located, at one time and another, more than 200 mineral claims, on most of which there is evidence of mineralization which shows continuity in two general directions—namely, east and west and north-west and south-east.

The *Iron Mask* and *Erin* veins are both of the east-west type and the ore-bodies, in search of which the present programme of development has been undertaken, are presumed to run in a north-west and south-east direction, intersecting the *Erin* vein, east of the shaft. About twenty men are employed continuously at the mine, and it is understood that after completing about 1,400 feet of the prospecting-work alluded to above the results are held to be sufficiently encouraging to justify the driving of another development crosscut for 1,100 feet, and this work has been commenced. There still remain large bodies of oxidized ore within the developed area of the old veins for which a scheme of economic treatment may yet be devised.

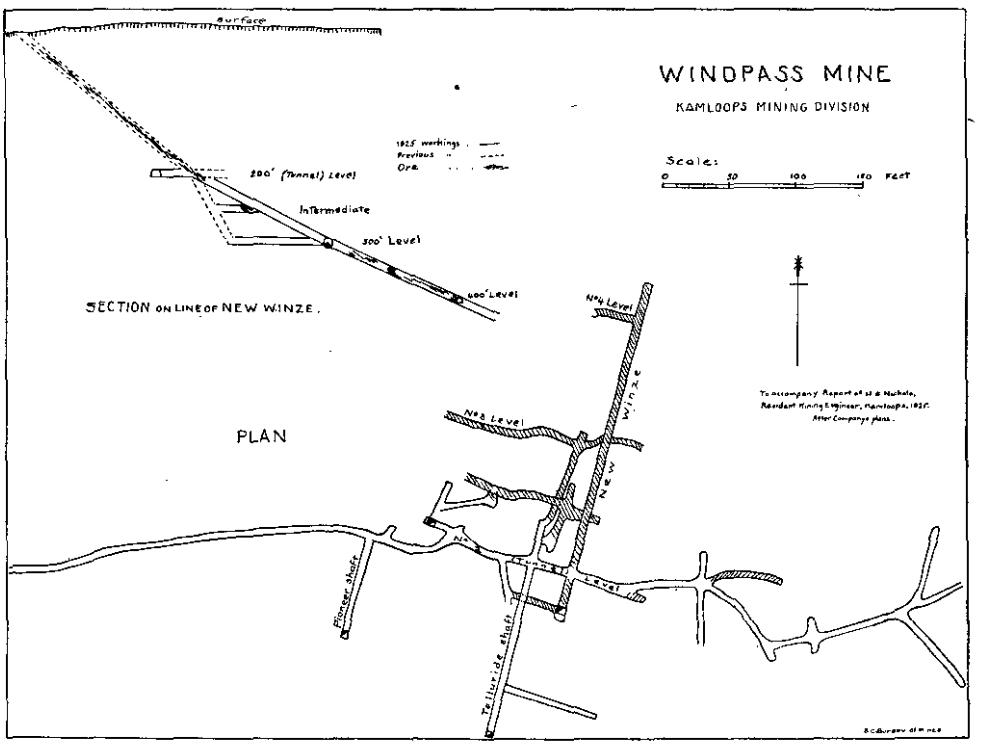
Copper Creek Cinnabar. During the past year two or three men have been employed in prospecting-work with a view to assuring a sufficient amount of ore to warrant resumption of operations and renewal of production of quicksilver by means of retorting, the ultimate purpose being to develop a sufficient tonnage of low-grade ore to warrant the adoption of continuous-feed furnace treatment or of concentration methods. It is understood that capital has been subscribed for the furtherance of this project.

CHU CHUA SECTION.

Windpass. The initial stages of the development of this property were described in the Annual Report for 1923, page 151, and the cessation of the work which was being carried out by Trites, Woods & Wilson was noted in the Annual Report

for the ensuing year. The results of the development to that date were considered to be disappointing, and, although there was estimated to be a considerable tonnage of payable ore in reserve, the prospects in regard to the continuance of the deposit in depth were held to be insufficient to warrant the outlay required for the provision of treatment plant. The view was entertained at that time, in some quarters, that the workings had passed into the foot-wall of the ore-body, and some of the last work that was done prior to the abandonment of the property was some diamond-drilling of boreholes, one of which was run out into the hanging-wall to test this possibility. This borehole failed to encounter ore.

In February, 1925, the property was bonded by B. N. Sharp, acting for the same group of New York capitalists that is operating the *Engineer* mine in the Atlin Division at the present time. The reason for this reopening of the property was the belief that the ore-body did indeed pass into the hanging-wall, but had been missed in the diamond-drill boreholes. The first work was to crosscut from a station in the shaft, intermediate between the main tunnel-level and the bottom, from which the diamond-drilling had been done, and in the first 20 feet of work a body of ore 6 feet wide was encountered, as anticipated. A crosscut was then started, following the



line of the diamond-drill borehole, at the lower level, and at a distance of 60 feet encountered a seam which had been passed through by the diamond-drill and which at that point was barren. Drifting east and west on this seam led to the discovery of ore. Towards the west for a distance of 95 feet values ranging from 40 cents to $154 to the ton were encountered over varying widths, but, while these values were in a way encouraging, they did not appear to represent any regular continuity.

The outstanding development was found in the work towards the east. In this drift, at a distance of 35 feet from the point of intersection by the crosscut, a body of ore was struck of an entirely dissimilar character from any yet found in the mine, from which samples taken across a width of 1 foot yielded assays as high as $517 a ton. This ore occurred in the bottom of the drift only and was followed for about 20 feet, when it again disappeared.

Provisions were then made for sinking on this ore and this entailed the putting through of another raise, up to the tunnel-level, in order to meet hoisting requirements. As soon as this

was completed sinking was commenced, and a winze has been put down for a further 100 feet on the dip of the seam, to a vertical depth below the No. 3 level of 42 feet, or approximately 90 feet vertically below the tunnel-level. While a moderately uniform hanging-wall was followed for the whole of this distance, the mineralization was found, from systematic sampling at intervals of 5 feet, to be erratic. Results were obtained ranging from a value of $308 a ton over a width of 1.5 feet to $1.60 over a width of 2 feet. At the depth above mentioned a body of ore was encountered for the full height of the winze, which assayed $75 to the ton, and at this point a drift was run to the west.

From the point of view of establishing anything like average values or continuity of ore-deposition within the flat-lying seam which has been referred to heretofore as the *Windpass* vein, the work in this drift, which has been continued for about 30 feet, is disappointing. The same remark applies, also, to the occurrences noted in the winze.

There appears to be, however, another way of considering the ore occurrence on this property. In the light of more recent development it is indicated that the mineralization has been introduced along channels other than those provided by the flat-dipping zone of shearing which has commanded sole attention up to the present time. From surface indications the view has been held that there might be indeed two such intersecting zones or veins, and in the development carried out by the former management towards the east on the tunnel-level several attempts were made to prove the existence of such intersection. A study of the ground in these workings, while it provides no encouragement for holding to the above-named conception of intersecting veins, reveals a system of cross-fracturing which in its relation to the flat-dipping seams would appear to be of later date. These fractures for the greater part follow a north-west and south-east direction and have steep dips. It is also noted throughout the workings that, while the hanging-wall of the flat-dipping seam is more or less uniform, the foot-wall is generally very broken, and many seams and stringers of ore, which have been responsible for the previous workings being carried into the foot-wall, are to be found dipping steeply away from it. There appear to be grounds, also, for believing that where the patches of richest ore are found in the winze, as alluded to above, there is a disturbance of the regularity of the flat-dipping seam; and lastly, in connection with the ore encountered in these lowest workings, there is a distinct suggestion that it is primarily identified with steeply dipping fractures, cutting obliquely across the flat-dipping seam, with which it would appear that the mineralization is only subordinately associated.

Examination of the distinctly new type of ore which was first recognized, as stated above, in the new work on the 300-foot level, and which is more or less identified with all the higher values encountered below, provides the strongest argument in favour of a different interpretation of the ore occurrence. This ore is a white feldspathic rock with small amounts of ferromagnesian minerals and scattered grains of chalcopyrite and other sulphides, with telluride of gold. It may either be an intruded pegmatite carrying the metals as primary constituents or it may be a highly feldspathized end product of the diorite country-rock. In either case its condition is the result of pneumatolytic action, and a suggestion, based upon the observed facts of its occurrence, is that it may follow the steeply dipping fractures in a north-west and south-east direction. These fractures are of more recent origin than the flat-dipping zone of shearing, in the shattered rock of which the further product of the pneumatolytic agency is manifested in the heavy mineral replacements encountered in the upper levels.

It may be mentioned that the winze was continued for a further distance of 32 feet below the 400-foot level and no values were found in the flat-dipping seam. Under these circumstances it would appear that a programme of development from the lowest level with a view to the investigation of such deeper source of mineralization is justified. The theory advanced is that the source of mineralization is from the north-west rather than from the south-east. In connection with the general idea of the ore-bodies in the flat-dipping seam and their apparent pitch being in relation to this intersection, it may be stated that the further work which has been carried on from the level intermediate between the tunnel-level and the 300-foot level, on which the discovery of ore in the hanging-wall was first made, under the new management, proved this body of ore to be about 40 feet long, having an average width of 6 feet and value of approximately $45 a ton. Beyond these limits high values, as, for instance, $430 over a width of 0.9 foot and $56, $96, $144, and $150 over widths of 1 foot and under, were found more or less irregularly distributed. With such high values as have been cited scattered throughout the workings, and

in view of the evidence that has been obtained bearing upon the introduction of the ore and its probable persistence in depth, there is every encouragement for the continued development of the mine.

Since work was resumed on this property in February, 1925, about 900 feet of work has been done, including about 270 feet of raising and sinking, over 100 feet of crosscutting, and about 500 feet of drifting. Twenty men have been employed on an average and the conduct of operations, in general, calls for a high degree of appreciation of the vigorous and intelligent methods that have been employed.

BARRIERE SECTION.

Assessment-work has been continued on several properties mentioned in the 1924 Annual Report, but with the exception of the *Silver Mineral* group, owned by H. Stephens and associates, of Kamloops, no developments of moment have been reported.

Silver Mineral Group.

Reference was made to this property under the title of *Silver Minnow* group in the Annual Report for 1924. The property is reached from Barriere, on the line of the Canadian National Railway, by a wagon-road to the junction of the North and East forks of the Barriere river, a distance of 12 miles, and from thence by trail 5 miles up the North fork. Prospecting has been carried out around an area where there appears to be an intersection between two series of fissures in an altered schist formation, both of which appear to be trending towards a zone of shearing in a band of limestone which can be traced across the hill for a considerable distance in a general north-south direction. Open-cuts in this shear-zone, at a vertical height of about 1,400 feet above the creek-level, show a width of 12 feet, over which the limestone has been greatly crushed and altered, with 2 feet of quartz on the hanging-wall. Galena is found scattered through the quartz and also in fractures and cross-seams passing through the body of the limestone. About 200 feet higher up the hill there is a series of five seams paralleling one another in a general north-east and south-west direction. On one of these seams a considerable amount of prospecting has been done and some heavy bodies of galena have been exposed in an open-cut near the intersection with an east-west zone of shearing. At this point an 8-inch seam of quartz, fairly well mineralized with galena, is also exposed. Mineralization in the north-east and south-west seam appears to die out at a distance of about 150 feet from the intersection, but, under the conditions of snowfall obtaining at the time of the examination, it was not possible to determine this point definitely, or in fact to do fair justice to the occurrence in general. The massive nature of the bodies of galena, which at one point were 2 feet wide, and the possibilities in connection with the wide zone of shearing above mentioned, in which also mineralization is noted, afford encouragement for developing this property at greater depth. An accurate survey of the several occurrences is necessary to such development, but it would seem that a favourable site for a crosscut tunnel could be selected. A sample of the galena above referred to, taken from a point about 75 feet from the east-west zone of shearing, and across a width of 2 feet, assayed: Gold, 0.02 oz.; silver, 27 oz. to the ton; lead, 50 per cent.

MOUNT OLIE SECTION.

Some interest has been taken during the past year in the placer-ground of the valleys of the North Thompson river and Lemieux creek around Mount Olie. The occurrence of placer gold in the beds of both Lemieux and its tributary, Eakin (3-Mile) creek, and indeed in most of the tributaries heading in the mountains towards the west, has been known for some time. Attempts have also been made from time to time to ground-sluice the material of the morainal benches that flank these valleys. Below these benches there are also extensive flats, and the opinion has been held in some quarters that these may represent an economic concentration which would permit of profitable dredging operation. In view of the scanty amount of prospecting, if any, in the mountainous country to the west of Lemieux creek it is premature to advance any definite theory in regard to the source of the gold. It would seem, however, in view of its occurrence in the valley gravels, from which natural concentration in the stream-beds has followed, and in the bench material itself, however small the amount of such content may be, a purely local source for it in the beds of conglomerate which have been cut through by Eakin creek in particular can hardly be assumed. This is especially the case in view of the fact that gold has been found in the bed of the creek above the horizon at which the conglomerate occurs. There are certain well-known spots in the beds of both Eakin creek and Lemieux creek from which it is possible to pan out several colours of gold at any time, and such happenings are always liable to create

an erroneous conception of average values. They may, however, be accepted as justifiable encouragement for further investigation as to the source of the gold, and in this connection the fact that gold has been found in small quantities in the main body of the bench material lends colour to the natural deduction of its concentration therefrom in the stream-beds. It is another matter, however, to conclude that reconcentration will be found in the flat areas lying below it, however attractive they might otherwise appear for dredging operations. It would appear desirable, therefore, that in any investigation which may be undertaken of the value of placer-ground in this neighbourhood priority should be given to the consideration of hydraulicking methods on the bench material. In this connection it may be said that a sufficiency of water for ground-sluice testing can be obtained in the first place, and at small cost, through an irrigation-ditch already in existence, and that a greater amount of water for ultimate operations can be made available when the ground is proved.

ADAMS LAKE SECTION.

Homestake. Work was resumed upon the *Homestake* mine on Adams lake in August, 1925, and a force of from twelve to fifteen men has been employed on development-work. The main purpose of this work has been to investigate the possibilities in connection with the higher-grade mineral-seams referred to in the 1924 Annual Report, and which was encountered on the hanging-wall side of the main body of barite.

KAMLOOPS SECTION.

Noonday. O. S. Batchelor and associates are reopening the shaft on this property, which is situated about 6 miles south of Kamloops. There is a well-defined quartz vein upon which a shaft was sunk to a depth of 100 feet and some drifting done on both the 50-foot and 100-foot levels. It is reported that the values obtained from the 50-foot level were encouraging. A sample taken across 30 inches in an open-cut above the shaft yielded only traces of gold and silver. The intention is to make a mill test of the ore from the 50-foot level. In connection with the operations in general it may be said that the retimbering of the shaft is being carried out in a workmanlike manner, and that the 5-stamp mill owned by Batchelor, at which the test is to be made, is in excellent condition. This mill is situated on the banks of the North Thompson river about 4 miles above Kamloops.

CLEARWATER SECTION.

Assessment-work on the *War Colt* and *Summit* claims has been carried out during the past year, and in connection with this little-known country around the headwaters of the North Thompson and Clearwater rivers it may be said that the geological conditions warrant a greater attention being paid to it.

SEYMOUR ARM SECTION.

Cotton Belt Group. Work has been resumed on this group of claims, which are situated at an elevation of about 6,000 feet on the hills to the south of Deep creek, a tributary of the Seymour river, and at a distance of about 18 miles from the head of Seymour arm. An account of the properties in this section, together with a sketch showing their location, appear in the Annual Report for 1922, pages 150 and 151.

A series of veins which occur in, and lie conformably with, the Pre-Cambrian schist formation has attracted intermittent attention for a number of years past. Where they have been exposed at the surface these veins have a north-west strike and a flat dip towards the south-west. They carry lead and zinc minerals with some silver and show marked persistence.

A considerable amount of prospecting-work has been done, including open-cuts, tunnels, and shallow shafts, and at one time a certain amount of diamond-drilling was done by the Granby Company. A company with head office in Vancouver has been formed and it is the intention to thoroughly prospect the occurrence.

In the bottom of a 50-foot incline shaft the vein which traverses the *Cotton Belt* property shows a marked flexure, indicating that a steeper dip may be found as depth is attained.

The present work, upon which three or four men have been employed through the winter, is being devoted to the continuation of a prospect-tunnel on the same vein upon which the above-mentioned shaft was sunk. While there are fairly definite walls to the fissure, which in this tunnel is approximately 3½ feet wide, the width occupied by noticeable mineralization varies,

and at the time of the examination there were only scattered traces of galena and sphalerite in the face. A sample representative of a width of 3 feet assayed: Gold, trace; silver, 1.6 oz. to the ton; lead, 4 per cent.; zinc, 1 per cent. Considerably higher assays have been reported from the property from time to time, and in the aforementioned shaft there is a well-defined seam of good-looking ore.

The property is considered to be attractive on geological grounds, but it is one which will require considerable expenditure for its adequate prospecting and development. There is a wagon-road for the first 6 miles of the distance from Seymour Arm and a good bridge over the river at the junction of the East fork. The rest of the distance is covered by a trail at the present time, upon which a considerable expenditure has been made, with assistance from the Government. Should these properties respond to development, the question of accessibility does not present as great difficulties as might be anticipated.

At the time that this property was visited the ground was covered with snow and observation could not be made of the surface, but the following information is made available through the courtesy of F. W. Guernsey, consulting engineer to the company:—

"The *Cotton Belt* vein has been traced on the surface for a distance of about 3 miles; it varies in width from 2 inches to 6½ feet. Paralleling the vein on its hanging-wall side is a band of white crystalline limestone which is a prominent feature of the topography, but does not appear to have any relation to the vein formation. The ore-minerals are lead and zinc sulphides occurring as stringers and disseminations in a hard, tough vein-filling. In an exposure above the tunnel where the present work is being done on the *Cotton Belt* claim a sample taken across 6½ feet of well-mineralized vein assayed: Silver, 3 oz. to the ton; lead, 12.8 per cent.; zinc, 4.2 per cent. It is estimated that the value of the ore is around $11.84 a ton and that if sufficient tonnage can be developed to warrant the erection of a concentrating-mill of a capacity of about 250 tons a day the total operating expenses, including freight and treatment of concentrate, would not exceed $10.10 a ton of ore mined."

LILLOOET MINING DIVISION.

Pioneer.

As mentioned in the Annual Report for 1924, page 143, operations at this mine were resumed in July of that year, under a partnership agreement entered into between D. Sloan and associates and H. Wallbridge and associates. At that time the situation was substantially as described by W. S. McCann,* and in view of the re-entry of this mine into the producing class and of the important development that has been achieved a summary of his remarks may be given as follows:—

There are two known veins occupying approximately parallel fissures which merge into one another in places and that have been produced in an augite-diorite intrusive. The solutions from which the vein materials were precipitated are believed to be genetically related to the intrusion, and it is reasonably certain that these fissures extend to great depth as long as they are contained in the augite diorite, and that the quartz and other minerals with which they are filled were deposited under almost uniform conditions within the limits of possible mining operations.

The strike of the *Pioneer* veins is approximately north of west; they dip steeply to the north and vary in width from 1 to 4 feet. The veins have been developed by three tunnels, two of which, Nos. 1 and 2, have been abandoned and are now inaccessible. In the upper or No. 1 tunnel No. 1 vein was encountered at a distance of 40 feet and was drifted on to the west for 42 feet. In No. 2 tunnel the same vein was cut at a distance of 29 feet and was followed to the east for 15 feet and to the west for 40 feet.

The main tunnel (No. 3) crosscuts No. 1 vein at a distance of 78 feet and No. 2 vein 18 feet farther north. At this level (100-foot) No. 1 vein has been followed eastward for 60 feet and westward for 200 feet. For almost the entire length of the workings this vein has been stoped nearly to the surface. No. 2 vein has been followed at this level 275 feet east of the main tunnel and 60 feet west, where the drift joins that of No. 1 vein at the intersection.

The shaft is on No. 1 vein at a point 160 feet west of the main tunnel and 90 feet west of the point where the veins come together. A small crosscut has been driven 20 feet from No. 1 vein at a point 30 feet east of the shaft. The 100-foot level is 65.5 feet below the collar of the shaft.

*Geological Survey, Canada, Memoir 130.

The 200-foot level is 166.5 feet below the collar of the shaft. Here the shaft is in diorite and the intersection of the veins lies about 15 feet to the south. To the east of the shaft the point at which the veins come together is encountered at a distance of 25 feet and both veins are exposed in the drift for 30 feet, or as far as the ventilating-shaft. From here No. 1 vein has been drifted along for 150 feet, where it is still exposed in the face. At a point 150 feet east of the main shaft a crosscut has been driven 35 feet northward, where No. 2 vein was encountered, and which has been followed eastward for 50 feet, where the veins appear to split. On the 300-foot level, which is 253.5 feet below the collar of the shaft, the No. 2 vein has been followed westward for 150 feet, and at a point 70 feet east of the shaft a crosscut 30 feet northward encounters No. 1 vein, which is followed westward for 90 feet. East of the shaft the drift continues for 70 feet.

In addition to the foregoing, the following notes are of interest:—

The mine was first located in 1897, and up to the time of the resumption of operations during 1925 the total production was about $1,350,000. The shaft has been sunk for a further vertical depth of 142 feet below the 300-foot level referred to above, and on a level which is approximately 400 feet below the collar of the shaft, drifts have been run on the No. 1 (or south) vein, east and west, for 100 feet and 135 feet respectively. The ore has been found to continue at this level and to maintain a grade at least as high as that of the average value of the ore previously encountered.

A raise was put up to the 300-foot level and a stope 200 feet in length has been carried between the two, which has yielded approximately 11,000 tons of ore. The ground has been stoped on a shrinkage method, 4,000 tons of ore having been won and milled, the remainder, 7,000 tons, with a content estimated to be of a value of $150,000, remaining in the stope. Some exceptionally high-grade ore was found on the bottom level and the results obtained in actual extraction support the view of continuity in depth which has been generally held. A sample taken across the back of the stope about 50 feet below the 300-foot level, and across a width of 3½ feet, assayed: Gold, 3 oz.; silver, 0.8 oz. to the ton.

Stoping was commenced in March, 1925, and the mill was kept running fairly steadily until operations were suspended for the winter, the unusually dry season being responsible for some limitation of capacity. Bullion to the value of $61,000 was produced from the seven-months' run, and the average value of the tailing, which is being impounded, is $5 a ton. An extraction of 74 per cent. was obtained and the estimated total value of the ore milled was $82,000, equal to an average of something over $20 a ton.

Compared with the records of previous operations, the general result of this season's work is to show that one at least of the two veins which are known to exist on this property is of greater average width and value for over 100 feet below the 300-foot level than it was above. The width of this vein as worked during the past season has averaged 5 feet and, as stated above, the average value is over $20 a ton. The machinery is all operated by water-power. The treatment plant consists of a 5-foot Chilian mill and amalgamating plant and 70 per cent. of the total extraction is effected by inside amalgamation. There are two 300-cubic-foot air-compressors, a drill-sharpener, three machines, and a hoist, all operated from a 195-horse-power turbine under a head of 43 feet. The water is brought by a 4-foot flume and it may be mentioned that a head of 300 feet could be secured by the construction of a ditch 1½ miles long. The intention of the present operators is to extend the development from the 400-foot level as soon as operations can be resumed in the spring of 1926. It is understood that, in addition to lateral prospecting, a long crosscut will be driven to explore the ground lying to the north and up to the contact of the intrusive with the rocks of the Bridge River series.

Lorne.

Some promising prospecting-work has been done on this property during the past year. From a brief examination the opinion was formed that the economic possibilities are greater than might be gathered from the history of the mine and from the general tenor of references that have been made to it. The extent and disconnected character of the many workings has had the effect of creating more or less vague impressions of the value of the ore-deposits, while the number of veins which have been prospected and their varying strikes have still further increased the difficulty of considering the property as a workable unit. The outstanding features of the *Lorne* mine are: The very considerable development of quartz in veins of the "transverse series" cited by McCann; the occurrence of a "main vein" attaining a width of 16 feet and associated with an albitite porphyry dyke; and unusually good facilities for development, power-supply, and treatment.

The greater part of the prospecting carried out during the past year has been connected with tracing the main vein on the surface. The strength of this vein and the conditions of its occurrence are ample justification for this concentration of attention. Its direction, which is approximately north-east and south-west, represents what is apparently the dominant line of fracturing in this section of the augite-diorite belt, and recent work has established the existence of other veins parallel to it. This main vein has now been traced over the surface for several hundred feet and has been shown by open-cuts to be as much as 16 feet wide in places and seldom less than 4 feet wide. It has been intersected by crosscuts from the underground workings at a depth of about 200 feet below the surface, at three different places, where widths of from 9 to 16 feet were established. In one of these crosscuts, where the two walls of the fissure were clearly defined, the width of the quartz occurring between them did not exceed 3 feet, but in the others the quartz-filling was continuous between walls. This vein has been carefully sampled during the past season, and assays varying from about $6 a ton, representing widths of 12 feet and over, to $100 a ton for samples taken over narrow sections were obtained.

The results of past development are summarized by W. S. McCann in Memoir 130, Geological Survey, Canada, page 86 *et seq.* This record indicates occasional high values in a number of veins of varying habit and insufficiently developed to permit of an estimate of assured tonnage. The particular feature that may now be stressed is that there is a very considerable tonnage of gold-bearing quartz to be derived from the main vein alone, justifying a scale of operations on which the average content may be anticipated to be economic ore.

Coronation. Development of this property has been resumed under the same management as that controlling the operations on the adjoining *Pioneer* property. A vertical 2-compartment shaft is being sunk well in the hanging-wall of the *Little Joe* ore-body, from which exceptionally high-grade ore was obtained in earlier days from a short shoot which averaged from 18 inches to 2 feet in width. The vein-fissure, in which this ore-body occurs, is persistent and has been developed from a series of tunnels to a depth of about 300 feet below the surface and for a distance of about 850 feet. The possibilities of this vein have not been thoroughly prospected. In places it attains considerably greater width, and other veins are also known to exist on the property. The present shaft is being put down to a depth of 200 feet and a crosscut will be run to intercept the *Little Joe* vein. Work is being done by machine-drill, the power being supplied by a crude-oil engine.

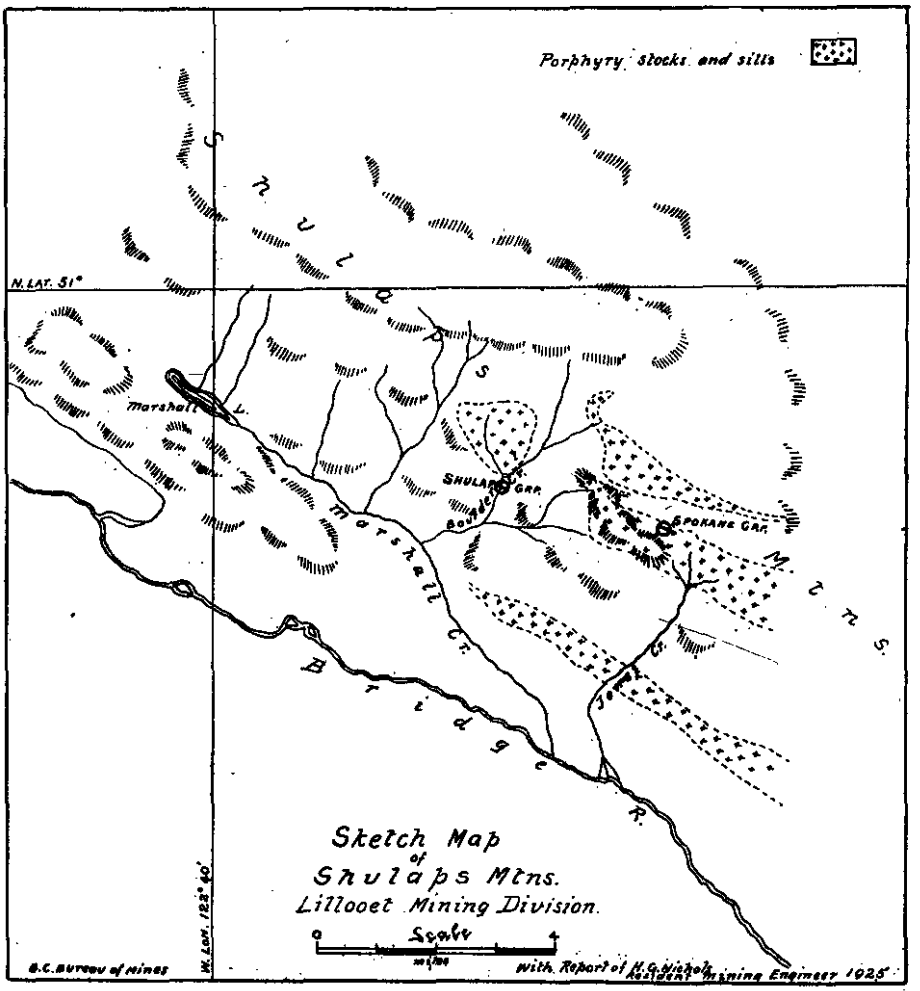
Native Son. This gold-bearing arsenopyrite-deposit has not been worked during the past year. An examination of the property gave rise to some doubts as to the continuity of the lenses of arsenopyrite which are exposed on the surface, some of the crosscut tunnels which have been driven having failed to intercept these bodies of ore where anticipated. The ground is very much broken up and it would appear to be advisable that future development should include a preliminary programme of diamond-drilling to establish the continuity or otherwise of these deposits.

Shulap. An interesting discovery of gold ore has been made by J. Russel and H. Swartz on Boulder creek, a tributary of Marshall creek, in the Shulaps range of mountains, on the north side of Bridge river. The occurrence of placer gold in the creeks of this locality has been known for several years, and some work had been done previously on a quartz vein situated in the same country, about 3 miles to the south-east of this year's discovery. This vein is on the *Spokane* group, referred to by W. S. McCann in Memoir 130 of the Geological Survey, page 98, and is reported to vary from 7 to 4½ feet in width and to have yielded values ranging from $10 to $30 a ton in gold, silver, and copper.

The *Shulap* group of claims was located in the early part of the summer by Russel and Swartz, who were led to the locality by the results of systematic panning of the stream deposits. The outcrop of a ledge, cutting the slaty rocks of the Bridge River series and in close relationship to a quartz-diorite dyke, is reported to have been traced over the hills on both sides of Boulder creek and to a vertical height of several hundred feet above it. The outcrop is said to be largely oxidized and weathered and free gold has been obtained by panning at six different points within a distance of over 1,500 feet. Open-cuts at an elevation of about 6,200 feet have exposed a width of 20 feet of ledge-matter, and a tunnel has been driven for 58 feet to crosscut the ledge near the bed of Boulder creek, at an elevation of approximately 5,400 feet. A sample taken across 7 feet, where the vein was first encountered in this tunnel, is said to have assayed: Gold, 0.8 oz.; silver, 2 oz. to the ton; and a sample taken from the face at a depth of 25 feet

below the surface assayed: Gold, 1.50 oz.; silver, 0.3 oz. to the ton. A quartz sample taken from one of the open-cuts at a distance of about 1,500 feet from the tunnel assayed: Gold, 1.30 oz.; silver, 0.2 oz. to the ton.

The particular interest of this occurrence lies in the fact that it appears to represent a mineralization associated with the intrusion of the Rexmount quartz-porphyry and points to further possibilities of valuable deposits of later origin than those generally found in the



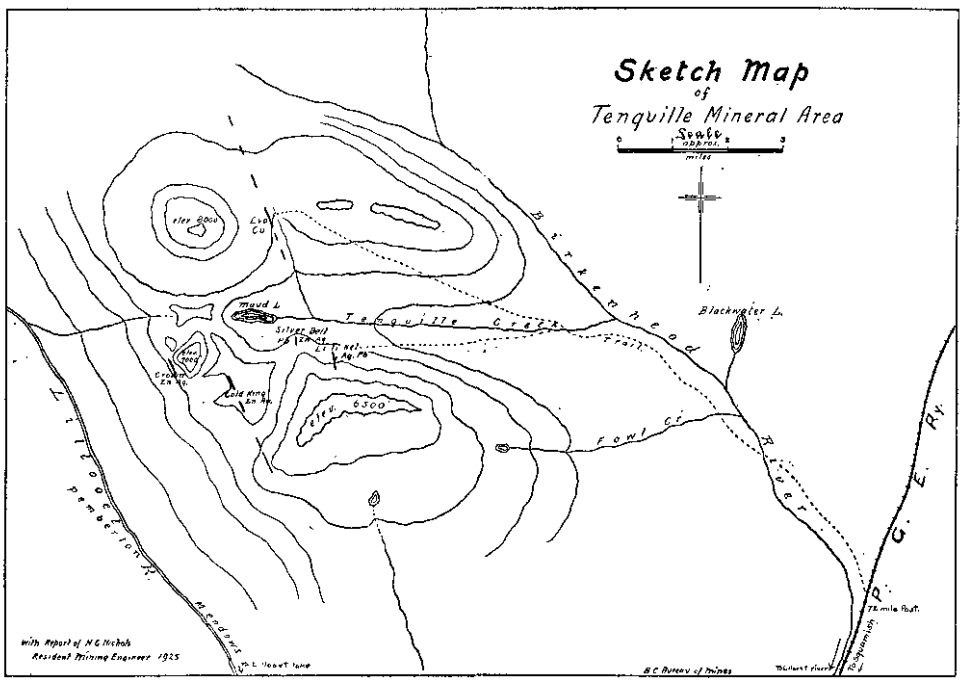
vicinity of the Coast Range batholith, and attributed to its influence. Although the exact age of this batholithic intrusion is subject to some doubt, and a certain amount of latitude is therefore to be conceded, speculation as to the genetic relationship of certain deposits in its vicinity, notably in the Whitewater area, has already been indulged in. Further investigation of the mineralizing influence of distinctly later intrusives, such as this Rexmount porphyry, is warranted, and prospecting is to be encouraged in areas where such intrusions occur. In this connection it may be stated that the Rexmount porphyry is clearly identical with the intrusive types referred to by J. D. McKenzie (Geological Survey, Summary Report, 1920, Part A, page 52A) as cutting the later formations of the Whitewater area.

TENQUILLE CREEK SECTION.

This section has been previously referred to as the Pemberton Meadows area (*see* Annual Report, 1922, page 166). At that time alternative routes were considered by way of Pemberton Meadows and the Tenquille valley. The distance by the former was about one-half of that by

the latter route. For this reason the section was referred to as being in the Pemberton Meadows area. Since that time the construction of a trail up the valley of Tenquille creek has demonstrated the superiority of this means of access, and the section is now considered as being tributary to the Pacific Great Eastern Railway towards the east and is therefore referred to as the Tenquille Creek section.

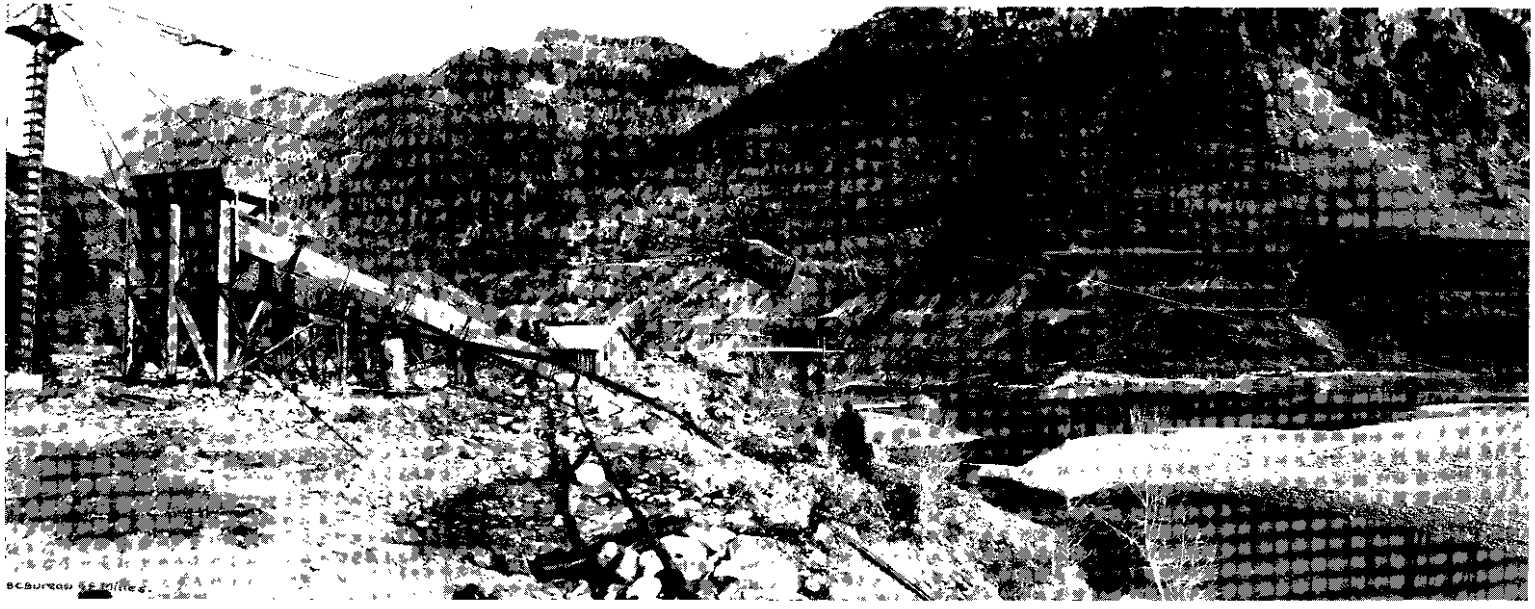
Notice was attracted in the first place to this camp by the operations of G. Moffat and Phil White, who have been developing a copper prospect near the headwaters of Tenquille creek and on its north side for several years past. Tenquille creek heads in a small lake at an elevation of approximately 5,000 feet above sea-level and at a distance of 14 miles from the line of the Pacific Great Eastern Railway at Birken. The mineralized area on which during the past few years intensive and useful prospecting-work has been done lies within a radius of about 2 miles, with this lake as the centre, at the summit of the divide bordering the Lillooet valley on its east side. In view of the handicaps to surface work at this high elevation, much credit is due for the extent and general soundness of the attempts which have been made to develop these prospects. The results that have been achieved have created considerable interest in a series



of very promising prospects, on which, in addition to the copper above referred to, high-grade silver-lead, zinc, and gold minerals have been found. The general impression gained from a visit to this camp is that there are possibilities not only of high-grade ore, but of considerable tonnage. The geology of the camp is dealt with by C. E. Cairnes, Geological Survey, Canada, Summary Report, 1924, Part A, page 76 *et seq.*

Eva Group. This property may be called the pioneer prospect of the camp and has been previously referred to (*see* Annual Report, 1922, page 168) as the *Moffat* group. Over 500 feet of tunnelling has been done. The greater part of the work has been devoted to prospecting a well-defined zone of shearing in a siliceous sericite schist, paralleling a quartz-porphyry dyke which is traceable for 1½ miles over the hill on the north side of Tenquille creek, at an elevation of about 7,000 feet. In places the shearing has developed intense fissility in this zone and numerous open-cuts have exposed varying degrees of copper mineralization over the whole distance alluded to above.

The work on the *Eva* group is confined to the steep hillside rising approximately to a height of 1,500 feet from the Tenquille valley. Here the schists appear to be more siliceous and the best results have been obtained from workings immediately adjacent to the porphyry dyke.



Universal Mining, Milling, and Reduction Co. Placer Mine at Lillooet.

In an open-cut and small shaft, which constitute the upper workings on this group, a width of 6 feet of mineralized ground is exposed, included in which is a seam 3 feet wide, from which at a depth of 15 feet below the surface a sample was taken which assayed: Gold, trace; silver, 1.6 oz. to the ton; copper, 5 per cent.

At a vertical depth of 100 feet below these workings a tunnel has been driven in on the same shear-zone, exposing narrower bands of schist heavily impregnated with pyrite and chalcopyrite. A sample from one of these spots assayed: Gold, trace; silver, 1.6 oz. to the ton; copper, 8.5 per cent. At a point 1,200 feet below, another tunnel was commenced alongside the same porphyry dyke, which, after crosscutting a certain distance to the west, encountered the same mineralized shear-zone, which here appears to be separated from the dyke by a horse of waste. In general it may be said that the more fissile the schists the stronger is the mineralization.

Over the summit of the hill to the north-west of the *Eva* workings the shear-zone passes through bands of limestone, and at such points strong gossan-outcrops are in evidence. At this higher elevation several crossing dykes can be traced on the surface, which appear to have direct connection with the main batholithic contact, three-quarters of a mile to the west. At the intersection of these dykes with what may be termed the main dyke paralleling the shear-zone there is an extensive development of quartz, in which galena is noticed as well as some bornite.

So far as the work has proceeded up to the present time, it is premature to attempt to estimate average values for this mineralized zone, but it appears reasonable to expect the development of important lenses of payable copper ore in the fissile schists, especially where there is development of silicification connected with the porphyry intrusions. The work that has been done by G. Moffat and Phil White may be cited as an example of how a prospect should be developed.

Li-li-kel. There is not much more to be added in regard to this property in addition to the account appearing in the Annual Report for 1922, page 167, and to the report of C. E. Cairnes, Geological Survey, Canada, Summary Report, 1924, page 98A, except that it is reported that the property has been bonded by the Federal Mining and Smelting Company. In general it may be stated that there is an insufficiency of work to permit of more being said about this occurrence than that there are narrow veins of very high-grade silver-lead ore. The property is situated on the rugged and steep hillside south of Tenquille creek. The following assays of samples taken give an indication of the values:—

From an open-cut near the summit of the hill at an elevation of about 5,600 feet, across 16 inches: Gold, 0.02 oz.; silver, 156 oz. to the ton. From an open-cut approximately 100 feet lower, at an intersection of a crossing vein, across 16 inches: Gold, 0.02 oz.; silver, 11 oz. to the ton; lead, 30 per cent.; zinc, 6 per cent. From an open-cut approximately 150 feet lower, across 4 feet, at intersection with crossing vein: Gold, 0.10 oz.; silver, 2.6 oz. to the ton; lead, *nil;* zinc, trace. From an open-cut at an elevation of approximately 5,100 feet, across 2 feet: Gold, 0.02 oz.; silver, 195 oz. to the ton; lead, 6 per cent.; zinc, 10 per cent. From a crossing seam at an elevation of approximately 4,900 feet, across 4 inches: Gold, 0.10 oz.; silver, 129.5 oz. to the ton; lead, 24 per cent.; zinc, 2.5 per cent.

Crown Group. Further development on this property, situated on the Lillooet River side of the divide at an elevation of over 6,000 feet, and which was referred to in the Annual Report, 1922, page 167, consists of two parallel tunnels which have been driven for 45 feet and 60 feet respectively from a point on the side-hill to the south-east of the saddle on which the principal outcrops occur, and at a depth of about 150 feet below them. This work does no more than prove the continuity of the shear-zone which is evidenced on the surface by the strong gossan-outcrop, and the reason for this paralleling of work is not obvious. The surface indications on this property call for development in depth by the continuation of one or other of the tunnels referred to. From the tunnels a thorough system of crosscutting below the original workings might be started, which would appear to be the best way to solve the structural problems referred to by C. E. Cairnes (Geological Survey, Canada, Summary Report, 1924, page 93A). Such work is decidedly justified in view of the strength of the occurrence and extent of the mineralization. A sample of the magnetite-garnet rock taken from the bottom of the 40-foot shaft assayed: Gold, trace; silver, 0.6 oz. to the ton; zinc, 14.5 per cent.

Silver Bell Group.

On this property a siliceous ore-body carrying copper, zinc, and lead minerals is found outcropping on the steep hillside below Maud lake, on the south side of the valley. It appears to be associated with a soft basic and almost vertical dyke, in contact with which it was first exposed in an open-cut; a tunnel has been driven on this dyke from a point about 180 feet vertically below the outcrop. From a point 125 feet from the portal of this tunnel a crosscut has been driven to the east for 50 feet, which intersected a narrow seam of heavy mineral that has been followed into the hill for a distance of 25 feet.

The vein-fissure, where it is exposed on the surface above and farther to the south, is about 5 feet wide and a sample taken across 2 feet of the width is said to have assayed $2.75 in gold and 2 oz. in silver to the ton. The narrow seam in the underground workings is 8 inches wide and a sample taken from it at the point where it was first intersected by the crosscut assayed: Gold, 0.10 oz.; silver, 19.5 oz. to the ton; lead, 16 per cent.; zinc, 11 per cent. It appears probable that the dyke and vein occurrences are of practically simultaneous origin and that the vein follows a more or less parallel fissuring, which merges into the dyke-fissure in places; thus, in the open-cut above referred to, the vein-matter is found on both sides of the dyke. It also appears on the surface as though the vein-fissure was diverging from the dyke-fissure towards the north-east, and that from its observed dip might be considerably farther removed from it on the tunnel-level than is the narrow seam in the crosscut above referred to. Under these circumstances it would seem desirable that the crosscut itself should be continued and the seam drifted on also, in a southerly direction, towards the point where it may be anticipated to merge into the dyke-fissuring.

Gold King Group.

This property is situated on both sides of a glacial valley lying almost due south of Maud lake and at an elevation of about 6,000 feet. A striking gossan-outcrop can be traced for a distance of over three-quarters of a mile along a zone of shearing in a country in which limestone is predominant. A number of open-cuts have been made showing considerable widths over which there is a notable mineralization. During the past year one of these open-cuts has been carried down to a depth of 10 feet below the surface and has broken into a body of solid mineral, from which a sample was taken over a width of 10 feet. This sample assayed: Gold, 1.30 oz.; silver, 0.70 oz. to the ton; lead, trace; zinc, 14 per cent.

The owners of this property have also located the *Dora May* group on the same line of strike and report values of $59.72 from samples taken from an open-cut considerably farther up the hill towards the south-east. The work that has been done indicates the possibility of a large ore-deposit and this property is considered to be one of the most attractive of the camp. It is not an easy one to develop in the prospecting stages and at first sight would appear to be highly inaccessible. If, however, this camp develops as anticipated, there is an excellent opportunity for a wagon-road of good grade up the whole length of the Tenquille valley to within half a mile of this property, below which the draw slopes steeply down to Maud lake, providing an excellent opportunity for commencing a development-tunnel at considerable depth, as required.

PLACER-MINING.

Universal Mining, Milling, and Reduction Co.

An extensive programme of operations for dredging the bars of the Fraser river at Lillooet is outlined by J. H. Gorton, general manager of the Universal Mining, Milling, and Reduction Company. This company has acquired 6 miles of dredging leases and is installing a new patent device for the recovery of fine gold, as well as a considerable amount of machinery for excavation by drag-line. The equipment includes 135 feet of flume, 75 feet of steel riffles, pumping plant, steel rope, and dredging-bucket with a 60-horse-power hoist; and the extraction plant includes an electric generator, four amalgam-plates, and other patented accessories. Operations are to be commenced as soon as the machinery is in running-order.

CLINTON MINING DIVISION.

Practically five-sixths of the area of this Division is occupied by recent lava-flows, in which opportunities for metal-mining are non-existent. A section bordering on a portion of the western boundary is that referred to as the Chilko Lake area, which has been explored recently by V. Dolmage and reported on by him in the Geological Survey, Canada, Summary Report for 1924, Part A. Eastwards of this area is the Taseko River (Whitewater) area, in which occur

the extensive limonite-deposits that have been previously referred to in detail, and in which also the *Windfall* claim and prospects related to the eastern contact of the Coast batholith are situated.

TASEKO.

No further developments are reported from this camp and prospectors who have been active there in the past are planning to work farther to the west, towards the heart of the Coast range.

The mineral-zone on which the *Massena* group is located is deserving of more attention. The establishment of the continuity of this zone is rendered difficult by the fact that it passes under an ice-field towards the south of the above-named group, but there are grounds for believing that it may be traced through the Bridge River area towards the headwaters of the Birkenhead river.

CHILKO LAKE.

V. Dolmage, of the Geological Survey, states that samples taken by prospectors from the north side of Skinner mountain are reported to carry small values in gold, and a sample taken by himself from a 5-inch vein north of Franklin area assayed: Arsenic, 6.46 per cent.; silver, 6.46 oz.; gold, 0.38 oz. to the ton.

Dolmage also reports copper and zinc mineralization in beds of limestone intruded by the granodiorite and recommends that further prospecting be done.

WARD AND WATSON BAR CREEKS.

A group of twelve claims has been located at the headwaters of these creeks, covering a deposit of antimony; the discovery was made by R. F. Butler.

PLACER-MINING.

Big Bar Creek.

Eight bench leases at the mouth of Big Bar creek were issued this year and work has been commenced upon them by W. G. Grimm and L. Myers. A drag-line outfit has been installed and some preliminary prospecting-work carried out on lease D. The ground is to be thoroughly tested in the spring.

Gold Pan.—This lease, near Big Bar, has been worked during the year and it is understood that operations are to be resumed on a larger scale when the weather permits.

The Holden leases at Crowsbar and the Hammond leases at Big Bar were allowed to lapse. Work has been continued on the placer leases along Ward creek, west of the Fraser river.

ASHCROFT MINING DIVISION.

Lode-mining in this Division has been identified chiefly with low-grade copper impregnation of zones of shearing and fracturing in a complex series of rocks of plutonic, volcanic, and sedimentary origin. This mineralization is of a possibly more recent origin than is the case with the ore-bodies in closer relationship to the seat of the main western batholithic intrusion. The Highland Valley area affords the best-known examples of this type of deposit.

At the south-west corner of the Division the country lying to the west of the Fraser river is included within the first-named subdivision of the district referred to in the introductory remarks of this report. It is a rugged section in which the mountains of the east flank of the Coast range reach elevations of from 6,000 to 8,000 feet and it has been but little prospected. Deposits of silver and asbestos have been discovered at the head of Kwolek creek and a certain amount of development-work was done some years ago on a body of molybdenite on Texas creek; about 9 tons of this ore, averaging 16 per cent. molybdenum, was shipped in 1916. Both the above-mentioned creeks are tributaries to the Fraser river.

Keystone.

This property, situated in Highland valley and upon which some work was done, was visited late in the fall. Samples were taken from two tunnels about 140 feet apart, driven from the same horizon, along a wide zone of shearing that appears to pass through both the granitic rock and the volcanics, which are here in contact. The mineralization, which is all in oxidized form, appeared to be confined for the greater part to individual seams from 2 to 3 feet wide, from two of which samples were taken and assayed as follows:—

No. 1, taken diagonally across seam for 25 feet alongside of tunnel: Gold, trace; silver, 0.4 oz. to the ton; copper, 2 per cent.

No. 2, taken across 2 feet of a second seam: Gold, trace; silver, 0.8 oz. to the ton; copper, 2.8 per cent.

A third sample was taken from an 8-inch seam in the face of one of the tunnels, which assayed: Gold, trace; silver, trace; copper, 2.7 per cent.

EIGHT-MILE CREEK.

Renewed interest has been shown in the copper prospects associated with wide zones of shearing in a granitic rock which are to be traced for considerable distances in this locality. A number of claims have been staked and some work has been done on the *Independence* group. Some lenses of fairly high-grade copper ore are said to be included.

PLACER-MINING.

With the exception of some work on a group of claims at Martel, where some new machinery has been installed, and at Kanaka bar, where F. C. Carter, of Lytton, has also put in some machinery, there has been but little activity in placer-work in this Division.

YALE MINING DIVISION.

This Division may be subdivided under three heads, namely: The Southern section, including areas tributary to Silver creek and the Skagit river; the Coquihalla River section; the Fraser River section.

THE SOUTHERN SECTION.

This area includes, as stated by C. E. Cairnes, "a variety of sedimentary, volcanic, and intrusive formations, and, as might be expected, affords a promising field for mineral-deposits." The principal types of ore occurrence that have been found in this section are:—

(1.) Veins and stringers of zinc-blende and galena in fracture-zones in a granitic rock, intrusive into limestone, and possibly affected by later quartz-diorite intrusions.

(2.) Bodies of pyrrhotite, with chalcopyrite and traces of nickel occurring as lenses associated with belts of lime-rock intruded by granodiorite.

(3.) Veins and stringers of pyrrhotite, with zinc-blende, chalcopyrite, stibnite, and arsenopyrite in fractured volcanic and sedimentary rocks (Hozameen series), apparently related to massive bodies of solid sulphide which have been introduced in a molten condition.

Examples of the above ore-deposits are *Elkhorn*, *Billican* group, *Silver Daisy*, and *Diamond* group. No development of moment is reported on these properties during the past year.

Shawatum (Ten-mile) Creek.

Values in nickel and copper are reported from mineral claims on Shawatum creek, a tributary of the Skagit river, formerly known as Ten-mile creek.

Bell Group.—Values in copper are reported from this property on 23-Mile creek, upon which F. Fritz and associates have been working.

COQUIHALLA RIVER SECTION.

This area was recently examined by C. E. Cairnes and a detailed description of particular value to prospectors is contained in Memoir 139, Geological Survey, Canada.

The principal economic feature is the occurrence of gold ores which are found under two distinct geological conditions. The most important class of deposits, in the present stage of development, is that of quartz veins in slates and greenstones intruded by diorite masses and porphyritic dykes. These veins occur in a belt of country approximately 2 miles wide crossing the line of the Kettle Valley Railway in a general north-west to south-east direction.

The best-known example is the *Emancipation* mine. In regard to these gold-quartz deposits it may be stated that mineralization is unevenly distributed, and large bodies of quartz in which there is no arsenopyrite are found without gold content.

Gold is also found in association with arsenopyrite in shear-zones in diorite. The *Aufeas* deposit belongs to this class.

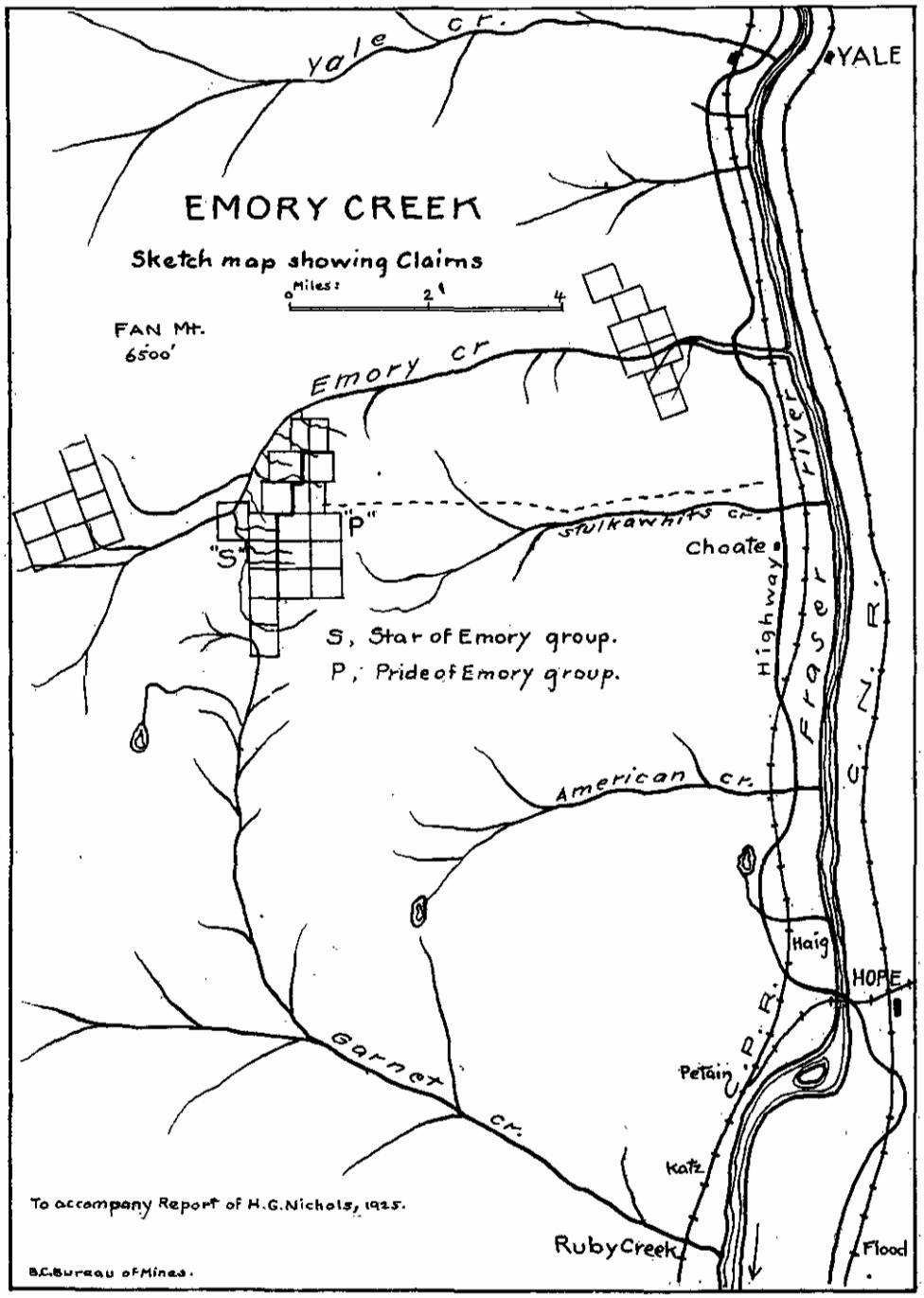
The production of silver will probably be a feature incidental to the future development of this section of the Yale Division. This forecast is in relation particularly to silver-lead deposits in the westward extension, towards the Coquihalla valley, of the Summit Camp mining area of the Similkameen Division.

Silver is also found at the *Eureka-Victoria* mine in the form of tetrahedrite occurring within fracture-zones in a conglomerate, intersected by a number of quartz-porphyry dykes.

The notable occurrence of copper ore at the *Independence* mine, situated approximately 2 miles to the east of Coquihalla lakes, has been described by C. Camsell and C. E. Cairnes

(Geological Survey, Canada, Summary Report, 1908, page 13; Summary Report, 1909, page 113; and Memoir 139, page 160). It is understood that plans for the further development of this ore-body are being matured.

Emancipation. This property is under bond to the Director Gold Mining Company. Three or four men have been employed in driving a tunnel and it is reported that a body of milling-ore has been opened up on the hanging-wall vein. The mill machinery is being overhauled with a view to early operation.



Idaho.—This property is being developed by A. E. Raab and associates. It is said that the results of work during the past season have been quite encouraging.

Morning Group.—This gold-quartz property on Ladner creek has been actively prospected by J. C. Nesbitt and associates.

FRASER RIVER SECTION.

The particular feature of this section is the continuation of the mineralized belt, which crosses the valley of the Fraser river in a north-westerly direction towards Lillooet lake, in association with the main contact of the Coast batholith. There is here an area lying to the west of the river which has been very little prospected. In addition to the indications afforded by the occurrence of placer gold along many of the tributary streams flowing from the west, a few promising prospects have been located; but the chief interest at the moment is in connection with the massive bodies of pyrrhotite which are characteristic of this belt, in one of which an occurrence of nickel has been found.

Star of Emory Group.

Continued development of the nickel-bearing deposit on this property during the year is reported to have shown a large tonnage of ore of economic grade. The property was examined by C. E. Cairnes and his report appears in the Summary Report of the Geological Survey, Canada, for 1924, Part A.

Hillsbar Creek.—A report on the gold-quartz veins that have been exposed in the bed of this creek appears in the Summary Report of the Geological Survey for 1923, Part A, page 81A *et seq.* Active prospecting during the past year is said to have achieved encouraging results.

Siwash Creek.—About 2 tons of ore showing free gold was shipped from a property at the forks of this creek.

PLACER-MINING.

Sowaqua Creek.—J. E. Brown has been prospecting this placer-ground and some encouraging discoveries of gold and platinum are reported.

Siwash Creek.—Extensive plans for hydraulicking operations on this creek have been made by J. C. Dumbolton and a crew of men has been employed in making preparations for the installation of machinery in the spring.

NICOLA MINING DIVISION.

Star.

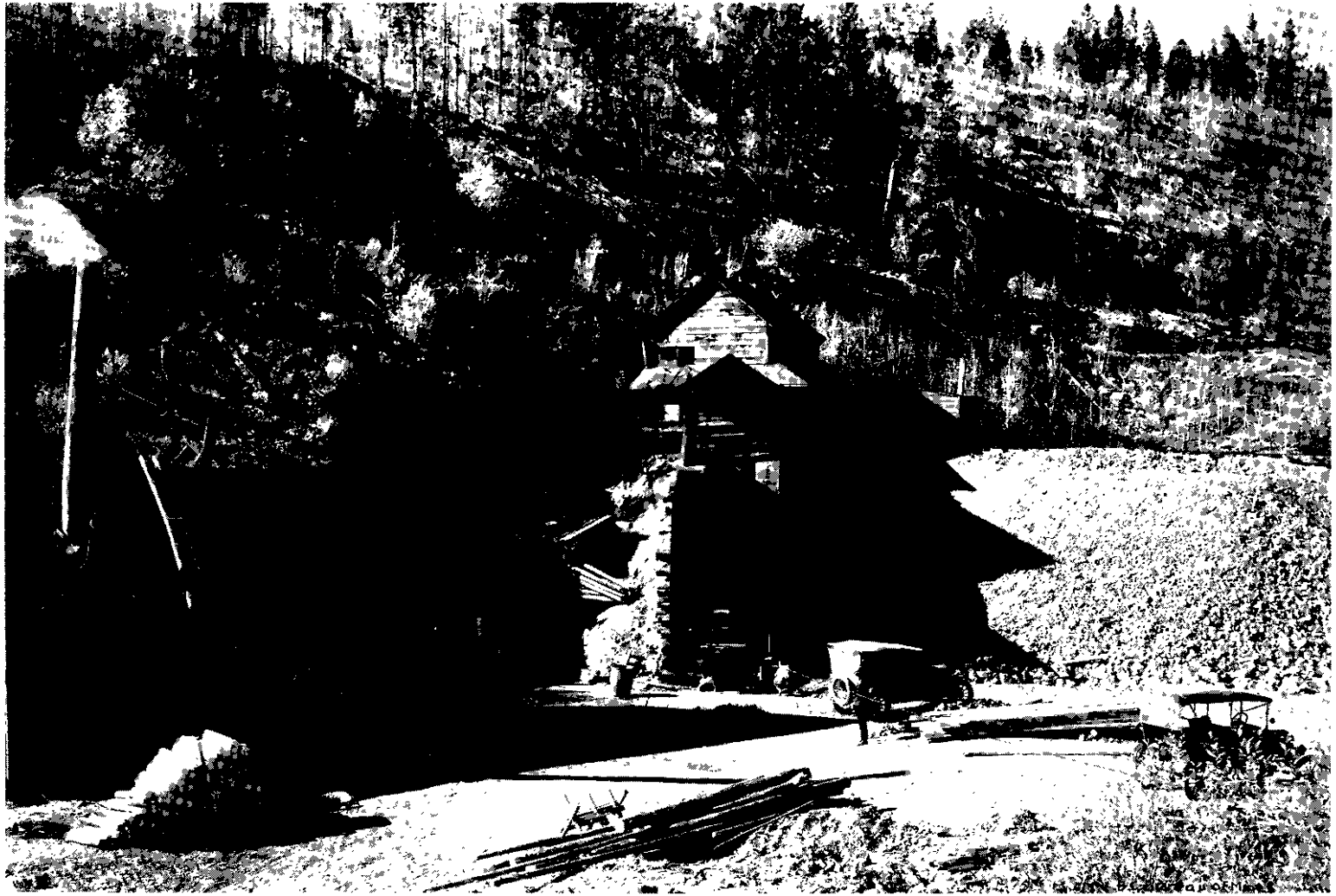
The old workings on this property were reopened by Planet Mines, Limited. There is an incline shaft on a well-defined vein having a strike approximately north and south and dipping 46° to the east. Near the surface this vein was about 14 inches wide, with a marked ribbon structure and heavily mineralized with lead and zinc. At a depth of 50 feet a south drift had been run on the vein, which at this point was 5 feet wide. A drift had also been run from the bottom of the shaft for about 15 feet and here the vein was only 18 inches wide. There has been very little surface prospecting, so that whether the swelling and pinching indicated in these workings is characteristic of the vein in general it is impossible to say.

The present company has installed some machinery and a force of about ten men was employed on development-work. Some 40 tons of ore has been extracted and shipped, and it is reported that there is a further amount of about 120 tons of lower-grade ore that has been extracted and is on the dump.

The results of the further development of this property will be interesting. It offers, perhaps, the best facilities for prospecting of any of the Stump Lake properties. The persistence of these veins in general, as evidenced by the amount of development that was carried out many years ago, renders them particularly attractive in view of improved methods of treatment that have come into being since work was abandoned. This, however, is not a poor man's camp.

Aberdeen.

A considerable amount of interest has been taken in the reopening of the *Aberdeen* mine, which has been referred to frequently in the Annual Reports of previous years. A considerable quantity of high-grade copper ore was extracted a few years ago from this ore-body, which is situated on Mamit creek, about 14 miles from the railway station at Coyle. Since that time the workings have been under water and no examination of the old stopes was possible until the workings were unwatered by Merritt Mines, Limited.



Merritt Mines, Ltd.—Aberdeen Mine, Nicola M.D.

The mine is developed by a vertical shaft, from which levels have been run at approximately 50 feet, 100 feet, 150 feet, and 200 feet below the surface. The ore occurrence is interesting and different opinions have been held in regard to its primary or secondary character. It is found in a zone of fracturing in highly altered volcanic rocks and the deposit was characterized by the occurrence of lenses and pockets of chalcocite to a depth of over 100 feet below the surface.

That these bodies are related to a system of intense fracturing is strongly indicated, and it is possible that the preservation of such surface-related secondary ore may have been due to the influence of a protective lava-cap, since eroded away. However this may be, the particular question of moment in regard to this deposit is in regard to its persistence in depth. An examination of the bottom workings, so far as these have been carried at the present time, reveals the entire absence of ore similar to that encountered on the levels above, which might be considered to be of secondary origin. It is to be noted that the attraction of the property has heretofore been in relation to the occurrence of this ore, which from the nature of its occurrence is easily mined and is rich enough to stand the cost of transportation as shipping-ore. On the bottom level there are some lenses and seams of a high-grade copper ore, but these are narrow and so scattered that it is questionable whether they could be extracted profitably. Situated as it is, at no great distance from the intrusive contact, and in view of the high grade of the ore which has been won from the mine in the past, this property represents a prospect of no little attraction and deserves more development. Its exploitation, however, should be undertaken with a realization of the possibility that the roots of this ore-deposit may be found to resolve themselves into a ramification of seams and fillings along joint-planes and fractures, such as are characteristic of so many mineralized areas of this formation.

The operations which have been carried out this year have been devoted mainly to taking out blocks of the high-grade ore, above referred to, which had been left in the upper workings of the mine. A crew of about twenty men has been employed steadily and some car-loads of ore has been shipped. The work has been carried out in a thoroughly workmanlike way and the shaft and general equipment is in good order.

Vimy Ridge. This property, which is located in proximity to the *Aberdeen* mine, has also been under development during 1925 by Merritt Mines, Limited. A vertical shaft, which had been sunk to a depth of about 100 feet to intercept a wide zone of shearing occurring at the surface and also prospected by means of an open-cut about 200 feet distant from the shaft, was continued down for a further 55 feet into the foot-wall, and a crosscut was driven to intercept the ore-body at this level. The continuation of the zone of fissuring was established by means of this crosscut, which passed through an intensely decomposed and talcose formation, in which seams and kidneys of bornite have been found. The occurrence is of sufficient strength and general merit to warrant further investigation, but it is hardly possible to arrive at any estimation of economic value in regard to depth until more solid conditions are reached. On the other hand, the open-cut work above referred to has demonstrated a by-no-means negligible copper content in oxidized mineral, and it would appear to be desirable that further surface work should be done to establish the continuity of this zone of fissuring and to obtain a more exact understanding of its values.

Almeda. O. A. Schmidt continued development-work on this zinc-lead property, on which a shaft had been sunk to a depth of 76 feet. This shaft is being continued to a depth of 125 feet, from which level it is proposed to drift on the vein. The ore in the shaft, carrying zinc, lead, gold, and silver, is stated to be 22 inches wide.

VERNON MINING DIVISION.

OKANAGAN LAKE SECTION.

Throughout the country around the north end of Okanagan lake there are a number of veins occurring in the micaceous schists, fractured gneisses, and hornblende schists described by Dawson in 1877. In general it must be stated that Dawson's remarks in connection with paying quantities of gold never having been found in these veins applies equally to the present time, but there has been very little work done in the way of effective prospecting since this statement was made. There are, however, indications of copper values associated with certain shear-zones in schists, and two prospects upon which work has been done during the past year call for comment. These are the property owned by W. Brent and the *British Empire* group.

Brent Property. This property was referred to in the Annual Report for 1923, page 161. Open-cuts have exposed widths up to about 12 feet in a zone of shearing from which values in gold, silver, and copper have been obtained, but prior to the work that has been done during the past year there was very little evidence available in regard to any particular sections of this zone with which the values were to be related or of continuity of the mineralization. The lowest open-cut, on the side of the hill bordering the extreme north end of the lake, has been extended during the past summer with more promising results. On the hanging-wall of the zone, which is dipping towards the north-east, there is a seam of disintegrated siliceous material, from which a sample was taken across a width of 16 inches. This sample assayed: Gold, trace; silver, 2.8 oz. to the ton. Towards the middle of the zone a seam of rusty copper-stained rock with some quartz had been exposed in the bottom of the cut, and a sample of this rock taken across a width of 2 feet assayed: Gold, trace; silver, 0.2 oz. to the ton; copper, 4.3 per cent. Sinking on this seam subsequent to the date of the examination, when above samples were taken, is reported to have opened up a better grade of ore, in which there are bands of solid chalcopyrite. This is a promising occurrence and in view of its favourable locality deserves further prospecting.

British Empire. This property has been bonded by A. M. Symons. A considerable amount of work in tunnelling, crosscutting, and raising was done several years ago. There are two series of intersecting quartz veins, from which sufficiently high values were occasionally obtained to warrant extraction of the gold in an arrastra. The property is situated almost exactly opposite Okanagan Landing on the shore of the lake and most of the work has been done on one persistent quartz vein that has been traced up over the hillside for a considerable distance.

All the veins are narrow and samples taken from the quartz itself are mostly disappointing. It is noted, however, that there are many pyritized seams in the crushed rock through which the network of intesecting veins pass, and the suggestion is conveyed that the values which have been obtained from this property in the past may be found to be associated with this material. The present operator is working on this hypothesis and it is his intention to install a small stamp-mill for the purpose of carrying out a thorough test on the property.

PLACER-MINING.

Cherry Creek.

There has been renewed activity in placer-mining in this section. During the past summer G. H. Thomas spent about $10,000 in development-work on a group of leases situated on the upper benches of Cherry creek, above Fall creek, and cleaned up about $1,850. The results of the work in general are said to be encouraging and an option has been given to J. E. Fales, of Seattle, who, it is understood, has formed a company under the title of Hydraulic Mines, Limited, for the purpose of working this and adjoining ground below during 1926.

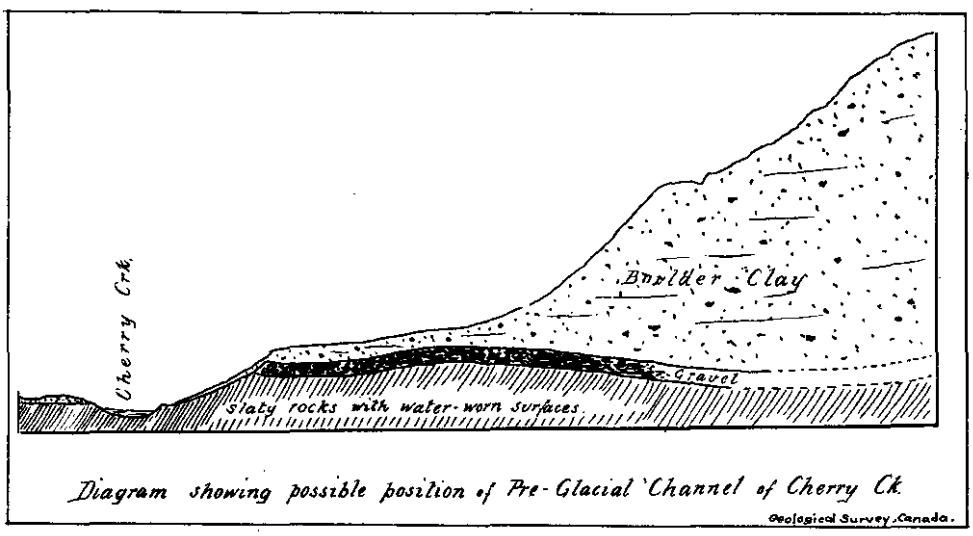
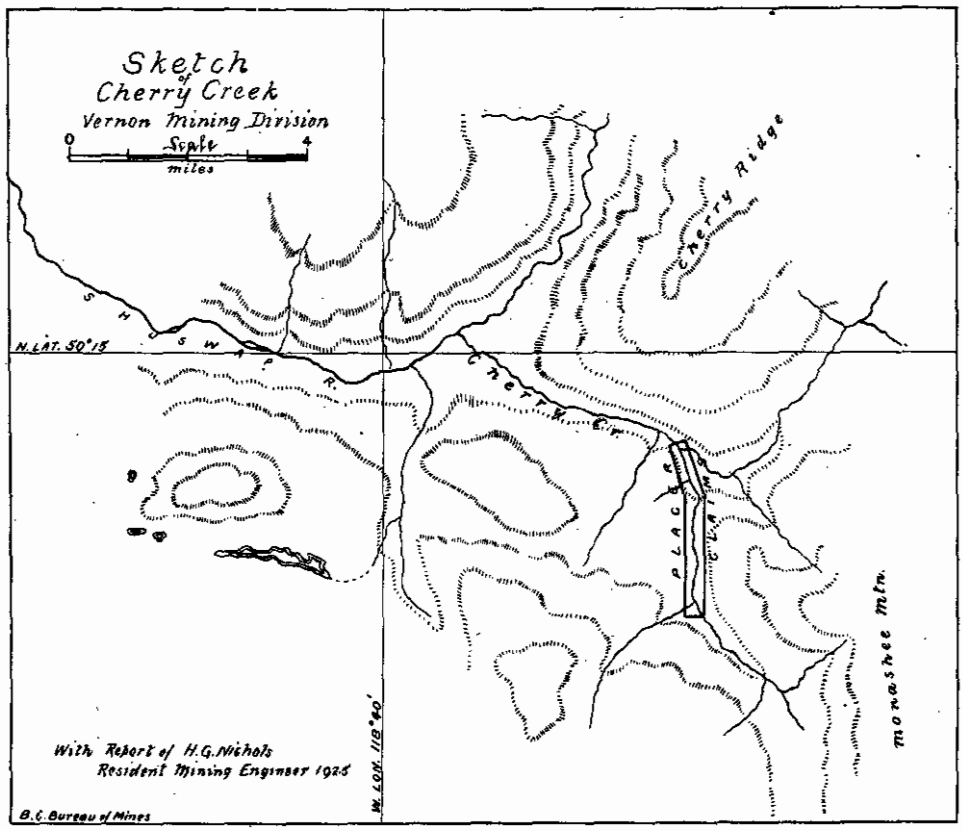


Diagram showing possible position of Pre-Glacial Channel of Cherry Ck.

Geological Survey, Canada.



Some business-men in Armstrong are also interested in a group of hydraulic leases higher up the creek and it is their intention to make a test of the ground during the three months, or thereabouts, of high water during the spring. In view of the interest aroused by this work it may be well to make some extracts from the report of G. M. Dawson, in the Report of Progress of the Geological Survey for the year 1877, which are in part as follows:—

Cherry creek, a tributary of the Shuswap river, has yielded a considerable quantity of gold. The portion of the creek which has proved remunerative is that part of the South fork extending for about 3½ miles above its junction with the North fork. The actual valley of the stream is here a narrow depression about 225 feet in depth, which scores the bottom of a broadly rounded valley, beyond which the mountains rise. This valley must have existed and carried a stream similar to the present in pre-glacial times, and it appears highly probable that the pre-glacial stream occupied, at least in part, the actual river-course now pursued by its successor. When the glacier-ice, which doubtless extended thus far from the axis of the Gold range, retreated, leaving the valley blocked with morainal material and boulder-clay due to action at this time, or in that immediately following it, the stream, again taking its way down the valley, began anew to excavate its bed. The soft materials were rapidly removed, the stream at first changing its bed frequently, but at last subsiding into the deep narrow valley in which it now flows. In some places this would appear to be identical with the original valley, while in others it is probable that a new course has been cut out in the rocky floor of the wide valley, leaving the old channel yet buried with drift on one side of the present. The canyons with steep rocky sides may represent such places, in which the stream has abandoned the pre-glacial channel and cut for itself a more direct course across some projecting rocky point. Such is a theoretical account of the Cherry Creek valley, which is, I believe, borne out by the facts, and, if so, becomes available as a valuable clue in tracing out the gold-deposits.

In the progress of hydraulic mining, which has been practised on a small scale at Cherry creek, interesting sections of the lower part of the drift deposits in that region, lying within the western border of the mountains of the Gold range, have been formed. From these it would appear that the gold occurs in paying quantity in pre-glacial gravels in the bottom of the valley of the stream. This accords with the position of the rich gravels of the Cariboo district, which in most cases would also appear to date from a time anterior to the glacial period. In a place where work had been abandoned

in July, 1877, the bank shows 40 or 50 feet of detrital deposits, resting on the somewhat water-worn, but, on the whole, rather rough surface of the slaty rocks. Immediately on the rock lies a clean, rough bouldery wash, above which is a thick or thin layer of fine, hard sandy material which shows current-bedding, often twisted in a remarkable way, and holds occasional large stones or boulders, some of which are pretty distinctly glaciated. A few clean-washed gravelly beds are intercalated with this sandy layer, but are very irregular in thickness and generally lenticular. Above this is a considerable thickness of stiff, stony clay, probably true boulder-clay. The stones in this are generally rounded and water-worn, and traces of bedding, which occasionally become quite distinct, occur, and conform more or less to the slope of the side of the valley. Above this are other layers, not very dissimilar in appearance, but less compact, and conforming quite evidently to the side of the valley. These are probably due to the wash of the boulder-clay down the slopes of the valley subsequent to the glacial period. The surface of the underlying rock in this place, after sloping gradually up to a height of about 10 feet above the water of Cherry creek, falls slightly as it passes under the bank, leading to the belief that a former channel of the stream may be found here (*see* sketch). This is also the case in the locality next quoted, which lies a short distance farther up the creek, and if such old channels can be found and followed, this district, as an alluvial gold-mining region, may have considerable permanence. The Christian and Schneider claim is at present the best on the creek. The stratum here resting on the rock and constituting the "pay-dirt" is a mass of boulders and stones from 5 to 8 feet thick, clayey, and much compacted. On this rests the stony clay with traces of stratification which has just been described, but without the intermediation of the irregular sandy deposits. This claim was situated on a little bench about 30 feet above the stream. The outer edge of this bench and the slope between it and the creek is composed of rock, in following the surface of which under the bank it is found to be covered with from 5 to 8 feet of rough, bouldery gravel, which constitutes the "pay-dirt." The rocky surface is also found to be smoothly water-worn and to slope away beneath the bank, and is soon buried under a great thickness of the stony clays. It would appear that the course of the pre-glacial stream was here to one side of the present, an idea confirmed by the fact that the bed-rock is found to slope away under the bank in the same manner in two other places at an extreme distance of about 300 yards. It is by no means improbable that this channel may leave the present and, running round to the left of the little hill at the canyon which separates the upper from the lower workings, may again join the present valley. If such a fact can be proved for this or any other similarly circumstanced part of the stream, a considerable area of "deep diggings" would at once be defined.

The claim above mentioned was yielding, I was told at the time of my visit, about $10 a hand for each working-day. The bank overlying the "pay-dirt" was being removed by the hydraulic method. During the autumn of 1877 a nugget worth $130, besides two others worth $90 and $40 respectively, were obtained on this claim.

The prevalent rocks in this part of Cherry creek are blackish slates and shales, which are traversed by many quartz veins. The rocks generally show distinct bedding-planes, which are marked by differences in their colour and composition. The general similarity of these beds to those of the auriferous series at Cariboo is quite marked.

The occurrence of rich silver ore at Cherry creek has been known for some time, and an attempt to develop the deposit, made some years since, while resulting in a considerable expenditure, was not prosecuted far enough to test thoroughly its nature and extent. The lode crosses Cherry creek obliquely and, I was informed, had originally been traced for about 70 feet, chiefly in the bed of the stream. On the bank of the stream, on the presumed line of continuation of the vein, an adit was begun, but driven for 15 feet only. Small and rather irregular veins appear in the slaty rocks. The ore is probably freibergite, with a little galena and blende, in a quartzose gangue. Fragments broken from a mass of the richer quality of the ore weighing about 20 lb., so as to represent all parts of it, yielded to Dr. Harrington on assay at the rate of 658.43 oz. silver to the ton.

Pellets of argentiferous galena found in the sluice-boxes on Cherry creek above the known lodes assay at the rate of 220.93 oz. to the ton and show the existence of lodes not yet discovered. Quartz veins are numerous in the surrounding district, and some of them were observed to contain galena, which, judging from that above mentioned, should also be highly argentiferous. About 2½ miles up the North fork of Cherry creek a rather irregular mass of quartz, formed apparently by the intersection of several smaller veins, is found. From this several tons have been blasted, and a sample assayed yielded, I am told, $300 worth of silver to the ton. This assay, however, represents a portion of the rock much richer than the average.

In the walls of the canyon below the first-described lode a very well-defined vein is seen in the cliffs on both sides of the river. A vertical section of about 150 feet is thus made, showing the vein to be over 10 feet thick in some places and never very thin. It does not appear to be richly metalliferous, but holds some galena, with spathic iron and iron pyrites.

COAL.

MERRITT COALFIELD.

The output of the Middlesboro Collieries, Limited, was approximately 37,686 long tons, shipments amounting to 33,626 tons. In the course of the moderate amount of development necessary to maintain the restricted tonnage a new section of what appears to be the old No. 2 seam, from which the best coal was obtained, has been encountered.

The Keystone Coal Company did 2,500 feet of development-work, exposing over 20,000 tons of coal; the output for the year 1925 was 5,927 tons.

HAT CREEK.*

Initial steps were taken during the year to develop the beds of lignite that occur in the soft shales and sandstones of upper Hat Creek valley. The occurrence was first reported by G. M. Dawson in 1877 and was more fully described by him in his report on the area of the Kamloops Sheet, 1894, page 207B *et seq.*

Seven diamond-drill holes were bored during the past year by a local company operating under the title of Hat Creek Coal, Limited (Non-Personal Liability), to depths varying from 150 to 635 feet. Coal was encountered in four of these holes and the existence of a number of thick bands of interbedded coal and shale was proved. The work was done within an area approximately 1 mile long by 1,000 feet wide. It is evident that this occurrence, which was referred to by Dawson as "this enormous lignite-bed," represents big tonnage; its value depends upon the settlement of questions relating to structural conditions in the field, its quality and economic extraction, and the establishment of markets in competition with higher-grade fuels.

The average of twenty-five analyses (twenty-three borehole cores and two tunnel averages) on this coal by the Provincial Government Assayer was:—

	Per Cent.
Moisture	18.2
Volatile combustible matter	30.4
Fixed carbon	41.2
Ash	10.2
	100.0

The average calorific value, as determined on eight samples by the Provincial Government Assayer, is 8,499 British thermal units. By applying Dowling's Split Volatile Ratio to the above analysis the numerical value of the ratio is 1.69 and the coal is therefore to be classed as a lignite.

KAMLOOPS COAL AREA.

The possibilities of coal occurrence in the Tranquille beds, as outlined in the first place by G. M. Dawson, were referred to at some length in the 1924 Annual Report. During 1925 prospecting was continued at and around the points indicated as being favourable, on both sides of the Thompson river. On the south side the incline shaft on the old Guerin ranch was reopened with a view to further investigation of the better-grade seams reported to have been encountered by drifting. On the north side of the river A. Galloway and associates put down a borehole to a depth of 779 feet at the point marked "B" shown on the sketch herewith. The log of this borehole shows that the drill passed through shale and sandstone with thin seams of conglomerate until a depth of 700 feet was reached, when volcanic rock was passed through for 11 feet, followed by shale and sandstone to 774 feet, when volcanic rock was again encountered and the hole was abandoned. One of the three possibilities indicated by Dawson thus appears to have been thoroughly investigated with negative results, but a considerable thickness of the beds above the horizon at which this work was started still remain to be investigated. In the bed of a small stream a few hundred feet west of the point where the drilling was done there are two or three indications of coal-seams, and when the drilling was stopped attention was devoted to these outcrops. A prospect-tunnel was driven in on a seam outcropping about 300 feet higher up the hill, with results that were held to justify some more work lower down the hill to pick up the coal on its observed dip.

CHU CHUA COAL AREA.

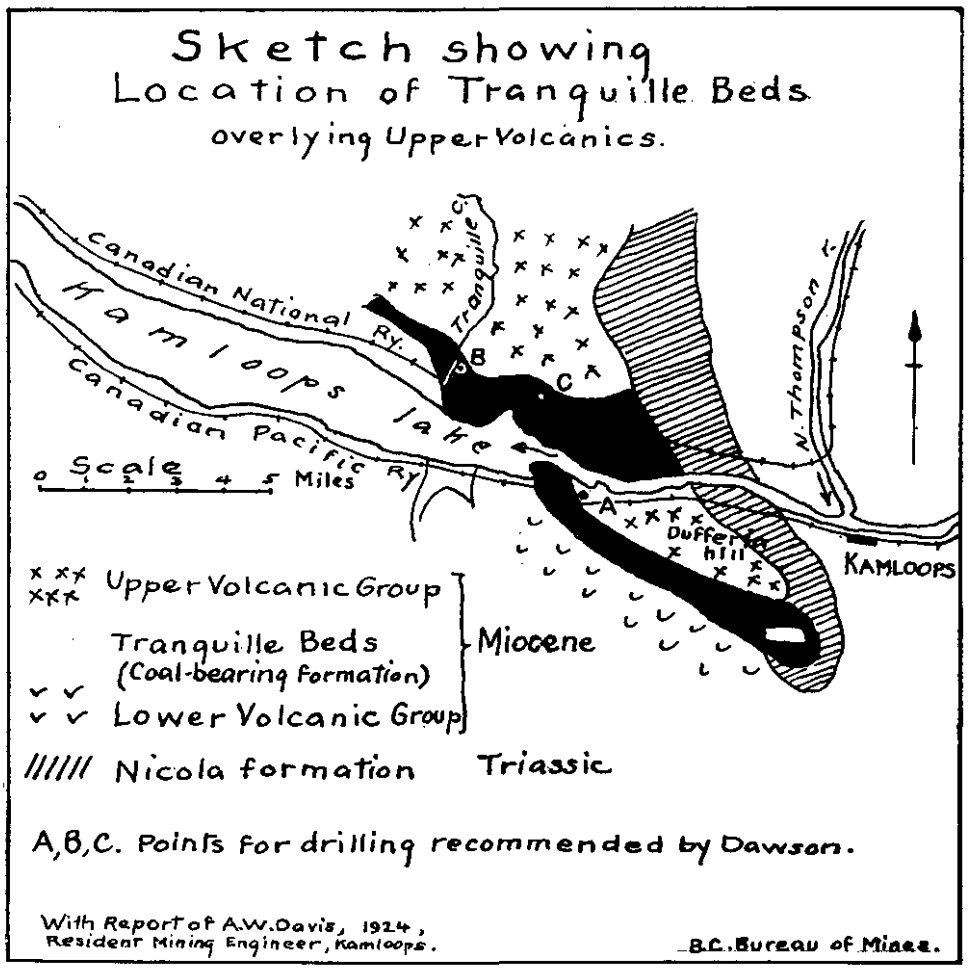
During the period 1920–23 an amount of about 3,200 long tons of coal was mined and shipped from some small seams lying in the Chu Chua formation of Tertiary sediments in the valley of the North Thompson river. The general nature of this occurrence of coal may be gathered from the following section of one of the seams. This section is taken from the report by W. L. Uglow in the Summary Report of the Geological Survey for 1921, Part A.

Sandstone roof.
12 inches hard, black, lustrous coal (streak brown).
1½ inches sandy shale.
1 inch hard lustrous coal.
3 inches grey sandstone.

* *See* special reports by B. R. MacKay and Chief Inspector.

10 inches hard, black, lustrous coal (streak brown).
3½ inches sandstone.
7 inches coal.
2 feet sandstone floor.
Total coal: 30 inches.

The coal is a hard black-lustrous variety which is classified either as a low-grade low-rank bituminous or low-grade high-rank sub-bituminous. The occurrence, so far as it has been exploited, would appear to lend itself to private enterprise rather than to operations by a company, as the coal requires careful sorting and the attempt to increase output was not attended by favourable results. The Chu Chua formation is found at two or three different places in the



neighbourhood of Chu Chua, but in each case the longitudinal extent of the exposures is limited. They are in fact erosion remnants and their occurrence at one point does not necessarily imply that their continuation in any direction may be taken for granted. This is an important fact to be borne in mind in connection with the coal area. The creek, in the banks of which the coal-measures have been exposed, cuts through a low ridge, which extends in a north-and-south direction for 5 or 6 miles, near its southern extremity. This ridge rises to a height of about 800 feet above the North Thompson river and extends back from it for about a mile. It is composed essentially of glacial drift, and, although its topography suggests that it may be underlain by the Chu Chua formation, these sediments are not found in any other of the stream-valleys by which the ridge is traversed.

An organization known as the Wigan Collieries, Limited, acquired property on this ridge, lying to the north of the property of the Chu Chua Coal Company referred to above, and during the year 1924 drove some tunnels into the bank of a stream which has cut its way down through a great thickness of drift. These tunnels followed more or less devious courses in the glacial drift. The lowest tunnel was driven between 450 and 500 feet in silt, to within about 15 feet of the face, when gravel with big boulders was encountered. Another tunnel was driven from a point about 300 feet farther up the creek for about 150 feet, and this tunnel is entirely in gravel, and above this again another short tunnel was driven, also in loose gravel. This work serves no useful purpose. No coal-measures have been encountered and there is no indication that seams of coal exist on the property. There is but one way to go about providing an argument in connection with possibilities of coal in this area, and that is by drilling. It is by no means certain that the whole of this ridge is underlain by the Chu Chua formation, or, if it is, that the coal-seams persist throughout it. There is, however, the possibility that two or more of the narrow seams that have been worked by the Chu Chua Coal Company may come together to form wider bodies of coal underlying the area. This hazard may be tested by drilling, but such work should be undertaken with full realization of its speculative character.

NON-METALLIC MINERALS.

The No. 3 District contains the greatest wealth of non-metallic minerals of any district in the Province.

The occurrences of soda, sodium sulphate, magnesite, hydromagnesite, barytes, silica, gypsum, and building-stone have been referred to at length in previous Annual Reports. There has been some activity in connection with the soda-lakes in the vicinity of the 70-Mile House, in the Clinton Division. About 3,000 tons of soda-crystal was taken from the lakes last winter, and an amount of approximately 750 tons was shipped to Vancouver during the year without dehydrating. A large amount of work was done in the construction of sheds and runways and making of roads, and it is understood that in connection with a consolidation of several of the leases, arrangements are under way for the erection of a dehydrating plant at Coulsons Spur on the Pacific Great Eastern Railway.

The extensive gypsum-deposits at Falkland, which have been made accessible by the construction during the past year of the Kamloops–Kelowna branch of the Canadian National Railway, are now being worked by the Manitoba Gypsum Company. The provisions for operation, including the construction of an aerial ropeway from the workings to the railway, were not completed until late in the year and shipments did not commence until December, 1925. About 600 tons was shipped during that month. The speedy response in this instance to adequate provision for transportation is a telling illustration of the fact that the development of the large resources, within this district generally, of raw material used in manufactures depends upon reduction of costs between the points of production and manufacture. This is especially the case in regard to the soda-deposits and there can be no doubt that the plan outlined above for conversion of the crude crystals into soda-ash will assist materially in the development of this industry.

SOUTHERN MINERAL SURVEY DISTRICT (No. 4).

BY PHILIP B. FREELAND, RESIDENT MINING ENGINEER.

INTRODUCTORY.

The Southern Mineral Survey District (No. 4), comprising four Mining Divisions—Grand Forks, Greenwood, Osoyoos, aand Similkameen—is situated in the extreme south centre of the Province of British Columbia, and is bounded on the south by the International Boundary-line, on the east by the height of land controlling western-flowing streams, on the north by the watershed of southern-flowing streams, and on the west by waters flowing east from the Coquihalla range of mountains.

Generally speaking, there has been in 1925 a marked improvement in mining throughout the district, resulting in increased tonnage production, due chiefly to the reopening of the Allenby Copper Company's mines at Copper mountain and activities at Beaverdell. A continued increase may be looked for during 1926, because the Copper Mountain mines commenced work late in the season and then operated at only about half capacity, with a promise of reaching full capacity soon, whilst the developments taking place at Beaverdell and Greenwood promise a further tonnage production. The *Horn Silver* mill near Similkameen Station will be completed early in 1926 and a larger production may be looked for. It also seems likely that there will be a substantial recovery of platinum and gold from the Tulameen placer mines, especially by the National Holdings, Limited. Unfortunately no data on placer production, though small, are available owing to the custom of "trading-in" with local merchants and shipping out of the country.

Many thanks are due to all mine operators and prospectors whose claims were visited, for their kindness and hospitality.

The following table demonstrates the increased tonnage over 1924 and total tonnage and contents produced in Mining Divisions for 1925:—

Division.	Ore.	Gold.	Silver.	Copper.	Lead.	Arsenic.	Coal.	Limestone.
	Tons.	Oz.	Oz.	Lb.	Lb.	Tons.	Tons (2,240 lb.)	Tons.
Grand Forks	36	.....	709	.....	19,224	.....	.....	35,150
Greenwood	1,773	53	480,822	.....	258,883	.....	.....	.....
Osoyoos	50,914	19,426	2,710	.....	.....	1,119	.....	.....
Similkameen	122,996	242	20,472	3,464,891	.....	.....	131,807	.....
Totals, 1925	175,719	19,721	504,713	3,464,891	278,107	1,119	131,807	35,150
Totals, 1924	50,315	19,589	430,435	150,538	239,635	248	160,017	24,418

PROSPECTING.

From time to time mention has been made in the annual report of this district of likely areas for prospecting, and depending generally on the demand for certain metals or non-metals, as the case might be. A résumé of these areas, under Mining Divisions for convenience sake, together with the more important minerals to be looked for, is given here:—

Grand Forks Mining Division.—In the Paulson section gold, silver, and lead are found with occurrences of platinum associated with pyrite in the Burnt basin. This is an old mining district, but is worthy of more intense prospecting and perhaps close examination of some of the semi-developed mines.

In the Cascade area the dunite rocks contain chromite which has been only partially developed.

In the vicinity of the Granby river (North fork of Kettle river) there are several prospects of silver, lead, zinc, and copper, whilst at Franklin camp the gold and copper ores command attention, especially in the pyroxenite rocks, which contain a good percentage of platinum where the copper sulphides are massive.

At the headwaters of the Granby river, named Lightning Peak camp, the silver-lead deposits are worthy of development.

A belt of serpentinized dunite rocks occurs at intervals between Grand Forks and Phoenix, and a certain amount of platinum is associated with the copper ores found near the contact of these rocks and the sedimentaries.

Greenwood Mining Division.—Further intensive prospecting and development of some of the old silver-lead mines near Greenwood is warranted, as well as a closer study of the copper occurrences at Copper camp beyond Deadwood.

Between Rock creek and Bridesville there are silver-lead deposits which have merit, and if the market price justifies it the chromite prospects in the same belt might be developed successfully.

The silver-lead deposits on Wallace mountain at Beaverdell need no advertising.

The country north and east, lying between the Kettle river and the West fork of the Kettle river, is worthy of closer study, especially along the contacts of the quartz monzonite and in the quartz diorite; also the gold-bearing arsenopyrite on Horseshoe mountain.

Osoyoos Mining Division.—The belt of schistose rocks predominating north of Osoyoos lake and between the Okanagan and Similkameen rivers contains many gold-bearing quartz veins which might be prospected.

The whole section of country lying within the curve of the Similkameen river between Princeton and Similkameen Station and north of the International Boundary has not been thoroughly prospected. The geology of that part of the country reported upon by R. A. Daly, in his 49th parallel survey, is sufficiently interesting to be followed up by closer inspection, especially on the contacts of the sedimentaries and igneous rocks. Native arsenic, tungsten, and strontianite have been found in the vicinity of the Ashnola river, which drains this part of the country to the north.

Similkameen Mining Division.—A continuation of the last-named area extends west as far as the Coquihalla and has been reported upon in sections by C. E. Cairnes, of the Geological Survey, Summary Report, 1922, Part A. Prospects of coal, silver-lead, and zinc have been found east and south of the Similkameen and Pasayten rivers. The belt of pyroxenite and peridotite rocks extends from Olivine mountain on the Tulameen river in a south-easterly direction to the International Boundary, and along the contact of these rocks in the weathered zones good prospects of platinum have been panned. Transportation facilities throughout the district are good and a great assistance to prospecting.

LIST OF REPORTS ON DISTRICT.

In the following table a list of the more important reports on parts of this district is given:—

Name of Author.	Publication.	Description.	Year.	Page.
R. W. Brock	Geological Survey of Canada	Boundary District	1901	49A
R. W. Brock	Geological Survey of Canada	Boundary District	1902–3	92A
R. A. A. Johnston	Geological Survey of Canada	Aspen Grove	1904	74A
Chas. Camsell	Geological Survey of Canada	Princeton	1907	.....
Chas. Camsell	Geological Survey of Canada	Hedley	1910	.....
Chas. Camsell	Geological Survey of Canada	Summary Report	1912	211
O. E. LeRoy	Geological Survey of Canada	Phoenix	1912	.....
R. A. Daly	Geological Survey of Canada	49th Parallel	1912	2 vols.
O. E. LeRoy	Geological Survey of Canada	Mother Lode	1913	.....
J. D. Galloway	Minister of Mines' Report	.....	1913	140–171
J. D. Galloway	Minister of Mines' Report	.....	1914	336–357
Leopold Reinecke	Geological Survey of Canada	Beaverdell	1915	.....
D. B. Dowling	Geological Survey of Canada	Coal	1915	255–261
C. W. Drysdale	Geological Survey of Canada	Franklin Camp	1915	.....
J. D. Galloway	Minister of Mines' Report	.....	1915	182–202
W. M. Brewer	Minister of Mines' Report	.....	1915	205
W. M. Brewer	Minister of Mines' Report	.....	1915	235
P. B. Freeland	Minister of Mines' Report	.....	1917	198
P. B. Freeland	Minister of Mines' Report	.....	1918	201
P. B. Freeland	Minister of Mines' Report	.....	1919	162
P. B. Freeland	Minister of Mines' Report	.....	1920	152

LIST OF REPORTS ON DISTRICT—*Continued.*

Name of Author.	Publication.	Description.	Year.	Page.
Munition Resources Com., Mines Branch, Ottawa		Platinum	1920	134, 147, 161
P. B. Freeland	Minister of Mines' Report		1921	176
P. B. Freeland	Minister of Mines' Report		1922	160
C. E. Cairnes	Geological Survey of Canada	Summary Report, Part A	1922	88
Eugene Poitevin	Geological Survey of Canada	Summary Report, Part A	1923	84
C. E. Cairnes	Geological Survey of Canada	Summary Report, Part A	1923	46
P. B. Freeland	Minister of Mines' Report		1923	176
P. B. Freeland	Minister of Mines' Report		1924	162

FOREST FIRES.

During the summer of 1925 forest fires raged for two months in nearly every part of the district and not only destroyed large sections of mining timber, especially at Beaverdell and Summit camp, Tulameen, but were a distinct hindrance in one respect to prospecting owing to the dense smoke permeating the whole country and the possibility of those in the hills being cut off from their supply base; in another way these fires help by clearing off many sections of the country where windfalls and dead timber prohibited easy access and hid the surface of the ground.

ROAD AND TRAIL CONSTRUCTION.

Many operating companies, syndicates, and prospectors in the district have received assistance from the Mines Department towards construction of roads, trails, and bridges leading to their mines and prospects, providing such mines and prospects warranted the expenditure. The results of this assistance, which gives the operator a chance to develop his claims instead of cutting out a trail or building a road, are demonstrated in the increased production. An approximate total of $12,000 was spent by the Mines Department for this work.

WORK IN OTHER DISTRICTS.

A considerable length of time was spent examining properties in District No. 3 after A. W. Davis, the former Resident Engineer for that district, left and before H. G. Nichols was appointed; also in District No. 5, due to the absence of the engineers. This extra work curtailed the comparatively short season to such an extent that trips planned to several localities were not made.

GRAND FORKS MINING DIVISION.

GRANBY RIVER SECTION (NORTH FORK OF THE KETTLE RIVER).

Rock Candy.

This mine was operated for a few weeks during the summer by the Consolidated Mining and Smelting Company of Canada and the ore (fluorspar) shipped direct to Trail, where it was concentrated by flotation for the company's own use. A high duty prohibits shipping the calcium-fluoride concentrate to the United States at the present time.

Bonanza Fraction Group.

This group includes the *Nita, Grand Forks Bell, McKinley, Motherlode, Iron Mask, Jumbo, Bluebell,* and *Bonanza Fraction* claims and is situated approximately 10 miles up the Granby river, on the east side, adjoining the wagon-road. The claims are owned by a Grand Forks mining syndicate, which has leased and bonded them to financial interests in Wallace, Idaho. The *Bonanza Fraction* claim is locally known as the "English and French."

Development-work consists of a 153-foot crosscut tunnel and 52 feet of drifting below the wagon-road on the *Bonanza Fraction*. About 100 feet higher in elevation and approximately 200 feet east, on the *Nita* claim, a shaft was sunk, assumed to be 50 feet deep, and a tunnel 30 feet long from the collar of the shaft; besides numerous open-cuts and shallow pits.

Since the property was leased and bonded work has been confined to the tunnel on the *Bonanza Fraction* and the drift driven on the ore to the north-east 48 feet and 6 feet to the south-west. A car-load of ore was sorted and shipped to the Trail smelter, carrying values in gold, silver, lead, and zinc.



Killarney Mine, Grand Forks M.D.



Silver Spot Mine, Greenwood M.D.

The country-rocks are volcanic tuffs and limestones, intruded by porphyry dykes. About 1,000 feet to the north-east the main intrusive rocks are granodiorite and they are probably responsible for the mineralization. The dykes, although finer in texture, are probably apophyses from the main intrusive.

The mineralized zone strikes north and south (mag.) and dips about 45° to the west. The ore-body is a replacement in the volcanic tuffs, having no defined commercial walls, which adds to the difficulty of exploration. The ore-minerals are galena, zinc-blende, pyrite, marcasite, and pyrrhotite, carrying gold and silver in a gangue of silica and calcite. The ore-deposit, so far developed, is about 20 feet long and 12 feet wide and appears to be the top of a lens which may have considerably larger proportions.

The lessees have discontinued work during the winter months, but intend pursuing development in the spring, when a shaft will probably be sunk on the lead in the *Bonanza Fraction* crosscut. These claims are ideally situated for operation, being within half a mile from railway transportation and the Granby river, and should the deposit prove to be too low grade to ship directly to the smelter a reduction plant could be economically operated.

Humming Bird. This claim, situated directly west of the *Bonanza Fraction* group and about three-quarters of a mile across the valley, was leased to J. McDonald *et al.*, of Grand Forks, and the old workings unwatered and sampled, with the idea of making a shipment to the smelter. These old workings consisted of a shaft 150 feet deep and a tunnel 144 feet in length. An exploration of the shaft and upraise disclosed the fact that there were no minable ore-bodies or veins developed.

The formation is a bedded limestone, which has been tilted about 12° to the west and into the hillside. The ore is pyrite and marcasite, containing gold and silver, and occurs in stringers and isolated segregations along the bedding-planes of the limestone. A considerable amount of alteration has taken place along the fractures; the limestone being replaced by silica.

To the north the sedimentaries have been intruded by a dark, fine-grained diabase dyke, which has apparently cut off the ore on that side. Further development along the strike, south-west (mag.) of the limestone, might discover other ore-bodies, seeing that swelling and pinching of a vein is characteristic in sedimentary rocks.

A shipment was made from this mine about twenty-five years ago, which was reported to contain values of $25 a ton in gold and silver. A sample of the ore from the shaft assayed 1.08 oz. in gold and 0.70 oz. in silver to the ton.

Golden Eagle. This claim was leased from the Government by Grand Forks interests and the veins in the old stopes sampled. Stories of high-grade copper-gold ore having been found in this mine twenty-five years ago led those interested to explore the old workings in hopes that there might be some tonnage left. There is little doubt that some good ore was found and shipped from the grass-roots down for 50 or 60 feet, but below that the values are too low grade to ship profitably.

The mine is situated about 11 miles up the Granby river from Grand Forks, on the east side, and approximately 1½ miles from the main wagon-road, at an elevation of 2,775 feet (barometric) above sea-level. A good wagon-road leads up to the property.

Development consists of a shaft 125 feet deep, a crosscut tunnel 383 feet long, drifting 363 feet, as well as stoping. Two veins were cut—the first, 140 feet from the mouth of the crosscut, and the other, 383 feet, which varied in width from 2 inches to 2 feet.

The country-rocks are volcanic tuffs intruded by pulaskite-porphyry dykes. To the north about a quarter of a mile the main intrusive granodiorite outcrops.

Samples of the ore, which is made up of pyrite, marcasite, chalcopyrite, malachite, and azurite, containing gold and silver in a gangue of quartz, assayed as follows: No. 1 first vein, stope, 0.20 oz. in gold, 2 oz. in silver to the ton; No. 2, second vein, tunnel, 0.06 oz. in gold, 1 oz. in silver to the ton, and 0.5 per cent. copper; No. 3, second vein, stope, 0.36 oz. in gold, 25 oz. in silver to the ton, and 5.6 per cent. copper.

Union.—This mine, mentioned in several former Annual Reports, including 1920, has lain idle during the year. Several inspections of the property were made, without those interested and the owners coming to terms.

Maple Leaf.—Assessment-work was done on this claim in the lower tunnel by Washington State interests. Better-grade ore is claimed to have been found.

Copper No. 2. The owners of this claim, Pete Santure and Joe Gelines, did assessment-work again this year, with much more encouraging results. (*See* Annual Report for 1924.) The limestone is becoming more highly mineralized with pyrite and more siliceous as the contact of the granodiorite is approached, and it seems likely that copper values will be encountered.

Little Bertha. The lower crosscut tunnel on this claim was extended about 50 feet during the year without striking any well-defined lead. The owners would be well advised if they confined the development of the mine to the upper workings for the present until they are sure of the persistency of the vein at depth.

HARDY AND OBSERVATION MOUNTAINS SECTION.

Yankee Girl and Yankee Boy. A map of the underground workings and some reference to these claims on Hardy mountain was made in the Annual Report for 1924. This year the lower crosscut tunnel was driven about 30 feet and intersected what appears to be the extension of the vein discovered above. A drift was also driven in this tunnel for about 50 feet and then abandoned for the present owing to the narrowness of the lead. Ab. Savage and Pat. Byrne, of Grand Forks, are underhand stoping the vein in the upper tunnel and have excavated and sacked about 17 tons of ore. Samples from these sacks assay from $40 to $78 a ton in gold and silver.

The lessees propose to continue sinking and stoping in the upper tunnel until they are satisfied that the vein persists at depth, when they will probably extend the lower drift under the ore-body and put in an upraise.

Slavonic and Victoria. These claims are situated on Observation mountain, overlooking the town of Grand Forks, and are owned by John Kitchen. Development-work consists of stripping, open-cuts, and a short tunnel 6 feet long. The mineralized zone, 10 feet wide, occurs in a highly siliceous altered banding of the schist, which is impregnated with pyrite and marcasite, carrying gold and silver. Much oxidation has tarnished the iron all the colours of the rainbow, which has given the impression of the presence of bornite. Samples assay from a trace to $3.50 in gold and silver to the ton.

The location of these claims close to transportation and power and the highly siliceous gangue make them a desirable prospect in view of the fact that the Trail smelter requires silica for fluxing purposes. Higher values will have to be found before the owner can expect to interest capital.

Old Granby Smelter.—The Boundary Mercantile and Equipment Company, of Greenwood, continued excavating the floor of the old smelter during the year and about 680 tons of residue containing gold, silver, and copper was shipped to the Trail smelter.

CHRISTINA LAKE AND PAULSON SECTION.

Fife Quarries.—The Consolidated Mining and Smelting Company of Canada shipped 35,150 tons of limestone from these quarries, situated on the east side of Christina lake, to the smelter at Trail for fluxing purposes.

Mother Lode. This claim, owned by Henry Jackson *et al.*, of Paulson, and situated in the Burnt basin, 2 miles west of Paulson, was bonded by the K.V. Mines, Limited, of Vancouver, under the direction of Percy Hugh Fraser, of Vancouver. Some development-work was done in the lower tunnel on the lead without any encouraging results. Prior development consists of 300 feet of tunnels, a 65-foot shaft, and 70 feet of open-cuts.

The veins, which occur in disturbed areas where porphyry dykes are most numerous, vary from 6 inches to 2 feet in width and consist chiefly of auriferous quartz. The vein has small segregations of pyrite, marcasite, galena, and zinc-blende scattered through it. Two samples said to contain platinum assayed as follows:—No. 1: Gold, 0.40 oz.; silver, 3 oz.; platinum, *nil*, to the ton. No. 2: Gold, trace; silver, 0.4 oz.; platinum, *nil*, to the ton. Chalcopyrite and molybdenite are also present. Quantitative analyses show values in platinum from 0.25 to 0.05 oz. to the ton in some samples, and in others *nil*. It is very evident, from careful sampling, that an average platinum value to the ton is unobtainable and therefore cannot be figured on. Even 0.25 oz. of platinum a ton, plus the gold and silver values, cannot be mined profitably in a small vein without exceptional transportation facilities.

Saddle Back and Saddle Back Fraction.

These claims, owned by Henry Jackson, of Paulson, are situated in the Burnt basin and adjoin the *Mother Lode* property. The K.V. Mines, Limited, leased and bonded these claims during the summer and did some development-work in the shaft. A few hundred pounds of silver-lead ore was mined but not shipped. An inspection of the shaft was impossible owing to water, but the management reported that after striking a fault at the bottom of the shaft which cut off the ore work was discontinued. The formation in the vicinity of these claims is limestone, intruded by porphyry dykes and greenstone. The ore occurs in stringers and lenses in the sedimentaries.

LIGHTNING PEAK SECTION.

To avoid confusion, it may be as well to state that this section covers claims in both the Grand Forks and Greenwood Mining Divisions. (*See* map in 1919 Annual Report.)

The headwaters of the Granby river (North fork of Kettle) and the East fork of the main Kettle river, now called Rendell creek, rise within a mile of each other, and the dividing line between the two separates the Mining Divisions; consequently some claims are partly in one Division and partly in the other, according to the flow of water. Those claims recorded in the Grand Forks Division will be dealt with under that heading and those recorded in Greenwood separately.

The mineralized belt lies in the schists and limestones which skirt the toe of Lightning peak on the north and north-west side and cover an area about 4 miles in length and from 1,000 feet to 1 mile in width. The ore-bodies generally conform to the strike of the schist, which curves from north and south on the *Waterloo* to north-east (mag.) on the *Lightning Peak* group, these claims being situated at the extreme ends of the mineralized zone. There are exceptions to this rule on the *I.X.L.* claim, a recent discovery, which will be reported upon later.

Practically all the development-work has been done at the extreme ends of this belt and very little is known at the present time regarding the possibilities in between. A heavy overburden of gravel and loam is accountable for this.

For the past ten years mining in this locality has been carried on intermittently by owners and lessees, with the result that there is only a small tonnage of ore blocked out or even developed on the surface. Practically all the high-grade mineral found has been mined and shipped on pack-horses and by rawhide over the winter trail. The costs of operating under these difficulties are virtually prohibitive, leaving but a small return for the miners' efforts.

The veins so far developed measure from 2 inches to 6 feet in width, the values generally becoming less as the vein widens. Samples from the smaller veins on the *Killarney* and *West Fork* carry values from 20 oz. in silver to the ton, 8 per cent. lead, and 9 per cent. zinc, to 180 oz. in silver to the ton, 50 per cent. lead, and 15 per cent. zinc. From the larger veins, such as on the *Waterloo* claim, values amounted to 18 oz. in silver to the ton, 8.5 per cent. lead, and 9 per cent. zinc, with much higher values obtainable with close sorting.

The present costs of transportation and smelting are as follows: Packing in supplies on horses over a trail, 16 miles, 4 cents a pound; hauling ore over a trail from mines to Edgewood road, 16 miles, $25 a ton; hauling ore from Edgewood road to Edgewood, 12 miles, $5 a ton; boat and railway haul to smelter, small lots, $5 a ton; treatment of ore at smelter, $8.70 a ton. The cost of mining and sorting the ore must be added to these figures.

When a mine is leased by the owner and no provision made for development, the result is that practically all the ore in sight is mined, unless the lessee is financially able to keep his development-work well ahead, which is seldom the case. The result of this is that when the property is offered for sale to any well-capitalized and reliable company or syndicate the examining engineer finds practically all the ore removed, and very often no sign of ore in the face of the drifts, owing often to faults or perhaps a pinching of the vein at that point. This condition is distinctly detrimental to the chances of selling any property and the owners of claims at Lightning peak should remember it.

A suggestion has been offered by some of the owners, as follows: "That the claims in the vicinity of Lightning peak should be grouped under one lease and bond and offered to capital, allowing plenty of time for development without any payments." If the claim-owners can agree upon this scheme there seems to be a good chance of determining the mining worth of this area, which is attractive. The veins so far developed are comparatively small, but amalgamated under

one capital development system they could probably be made to pay. Transportation facilities will probably await some comprehensive scheme such as outlined above, whereby sufficient tonnage can be blocked out to warrant the expenditure.

Lightning Peak Group.

This group, consisting of the *Thunder Hill*, *First Chance*, *West Fork*, and *Jim Hill* claims, has been leased by W. A. Calder, of Edgewood. A few tons of silver-lead ore was shipped to the smelter at Trail. Several hundred feet of tunnels and a shaft 95 feet deep constitutes the development-work, but there is very little ore developed, although several hundred tons has been shipped. According to the present lessee, a considerable tonnage of ore was blocked out in the shaft several years ago, but not mined owing to the low price of lead and silver. The shaft is at present full of water and could not be examined.

The country-rock is schist, which has been intruded by fine-grained porphyry dykes. The vein, which is made up of pyrite, marcasite, galena, zinc-blende, and silver in a gangue of quartz, varies from 2 inches to 2 feet in width. A sample of the sorted ore assayed 50 oz. in silver to the ton and 50 per cent. lead. The strike of the lead varies from N. 47° E. (mag.) to N. 63° E. (mag.), dipping 47° to the north-west. A good log cabin has been built on this claim.

Killarney.

This claim adjoins the *Lightning Peak* group to the south-west and is owned by W. J. Banting, of Edgewood. The vein, which is from 4 to 6 inches wide, appears to be an extension of the *Lightning Peak* lead that has been thrown by a fault, and has a strike, where developed, of N. 86° W. (mag.). The ore-minerals are chiefly galena and zinc-blende carrying silver. A sample from this vein assayed a trace in gold and 180 oz. in silver to the ton, 49 per cent. lead, and 3 per cent. zinc.

At the present time a crosscut is being driven 125 feet below to tap the vein uncovered in an open-cut. Should the vein persist in its dip, this should be accomplished within 20 feet of the face of the crosscut.

The formation is similar to that on the *Lightning Peak* group, a schist intruded by fine-grained porphyry dykes. A good log cabin has recently been built on the property.

Rampulo Group.—This group of claims adjoins the *Killarney* on the west side and has been Crown-granted by T. Cortiana (now deceased). No work was done this year.

GREENWOOD MINING DIVISION.

LIGHTNING PEAK SECTION.

Between the *Rampulo* group of claims and the *Silver Spot* claim a considerable amount of prospecting has been done without any well-defined leads being developed.

Some very high-grade secondary silver ore was found on the *Lumpy* claim, which occurred in stringers and small segregations, but the original locators were unable to trace this lead at depth, chiefly owing to the broken nature of the ground. Other attempts by sluicing were made beyond the *Lumpy* claim, and after removing from 2 to 6 feet of overburden a mineralized zone was discovered containing galena, zinc-blende, and pyrite. Very little work has been done on this discovery to prove its value.

A.U. and Silver Spot No. 2.

These claims are situated approximately 3½ miles from the *Lightning Peak* group and are owned by Jim Graham, of Greenwood. Surface-trenching, open-cuts, and shallow shafts excavated about 200 feet apart developed a vein about 1,500 feet in length, striking from north and south (mag.) to north-west (mag.) and dipping about 45° south-west. The ore-minerals are galena, pyrite, marcasite, and zinc-blende in a gangue of quartz. A sample from a shaft 10 feet deep, where the vein was 10 inches wide, assayed 0.12 oz. in gold and 24.5 oz. in silver to the ton, 13 per cent. lead, and 4.5 per cent. zinc.

I.X.L.

This claim was staked on the westerly extension of the *A.U.* and *Silver Spot* lead and is owned by Robert Lee, of Greenwood. Development-work consisting of trenching, open-cuts, and shallow pits uncovered a continuance of the vein in this direction. The ore, striking north and south (mag.), accompanies, and is generally in contact with, a narrow highly siliceous white dyke which is probably genetically connected with the granite batholith that outcrops on the western boundary of the Lightning Peak sedimentaries. The vein, which contains pyrite, marcasite, galena, zinc-blende, gold, and silver in a gangue of quartz, was probably formed about the same time as the dyke. This may account for the difference in the strike of this vein from the others in this belt.

The *A.U.*, *Silver Spot No. 2*, and *I.X.L.* claims have promising showings and, although small, still warrant development.

Waterloo. This claim, owned by Arthur Rendell, of Trail, has been referred to in the Annual Reports for 1918 and 1919. Since that time assessment-work has proven the continuance of the lead down the hill. There appears to be a good chance of obtaining a large tonnage of medium-grade silver-lead-zinc ore on this property and it is well worth considering in conjunction with the smaller veins in the locality. This also applies to the *Silver Spot* mineral claim (owned by Adam Scia), which lies in between the *Waterloo* and *Silver Spot No. 2*.

GREENWOOD SECTION.

In spite of the persistent suggestions from those unfamiliar with the activities in the Boundary section that mining is dead, the prospects in the vicinity of Greenwood never looked better since the closing of the Canada Copper Corporation smelter some years ago.

If those living in the town had accepted this verdict it is probable that there would have been a temporary suspension of activities; but owing to the healthy optimism prevailing amongst the members of the mining fraternity, for which they are to be congratulated, another lease of life has been accorded the district. Results may not be forthcoming for another year.

The following mineral claims reported upon in previous Annual Reports have made shipments to the Trail smelter during the year: *Helen*, 5 tons, owned by O. Lofstad, Greenwood; *Combination*, 2 tons, owned by a Spokane syndicate; *Prince Henry*, 5 tons, owned by G. S. Walters *et al.*, Greenwood; *No. 7*, 18 tons, owned by J. W. Clark, Greenwood; *Crescent*, 9 tons, owned by George and W. Thompson, Greenwood.

The following claims have been acquired recently and will be developed during 1926: *E. Pluribus Unum*, situated within a mile of Greenwood and owned by Henry Jackson, of Paulson and Greenwood; *Dynamo*, owned by W. McDonnell, of Greenwood, and situated about 1,000 feet south-west of the *E.P.U.*; and *Keno*, situated to the south-east of Phoenix, owned by E. A. Wanke and associates, of Greenwood, and bonded to L. Smith and Company, of Nevada.

Elkhorn Fraction. This claim, adjoining the *Providence* mine to the south-west and owned by W. McKenzie, of Greenwood, was leased and bonded to G. S. Walters and associates, of Greenwood, in 1924. A crosscut was driven in a south-easterly direction from the bottom of the shaft, which cut the extension of the *Providence* vein at about 40 feet. Drifts were driven on the lead 15 feet to the north-east and 25 feet to the south-west, developing the vein, which varies from 6 to 18 inches in width, for that distance.

The ore-minerals are galena, zinc-blende, pyrite, gold, and silver in a gangue of quartz and calcite. Free gold and silver are noticeable with the naked eye and appear to be associated with the calcite-filling. A small shipment was made to the smelter.

Late in the autumn the lessees bonded this claim to Roy Clothier and associates, of Greenwood, who have installed a compressor and intend developing the property to its full extent.

Providence. J. W. Clark *et al.*, of Greenwood, leased the *Providence* mine dump and have shipped several hundred tons to the smelter at Trail, carrying values in gold, silver, lead, and zinc. Most of this material is second-class ore sorted from the high grade shipped in previous years to Trail and represents a large tonnage.

Gold Pick Fraction. This claim, situated approximately three-quarters of a mile north of Greenwood and beside the C.P.R. track, is owned and being worked by W. Raveley, of Greenwood. There has not been sufficient work done to prove the extent of the veins, two in number, that were recently discovered. Some high assays in gold and silver were obtained from oxidized material on the surface. The ore-minerals are galena and pyrite in a gangue of quartz.

Strathmore.—This property was reported upon in 1924. Since that time 5 tons of silver-lead ore was shipped to the smelter.

Spotted Horse.—The lower tunnel on this claim was driven ahead during the early part of the year and the lead developed for about 75 feet. Owing to financial troubles work has been discontinued for the present.

D.A. Fraction. This claim, reported on in the Annual Report for 1924, is being developed by a crosscut tunnel driven about 125 feet below the outcrops of the veins. James Skilton and Jim Graham, of Greenwood, are operating the property. Two veins have been intersected, but not explored to any extent up to the present. Samples from

these veins taken by the owners assayed as follows: 0.37 oz. and 0.14 oz. in gold, 43.6 oz. and 14.4 oz. in silver to the ton. The ore-minerals are pyrite, marcasite, arsenopyrite, and magnetite in a gangue of quartz and silica.

Imperial Group.

This group, consisting of the following mineral claims: *Emeline, Imperial, Imperial No. 1, Badger, Badger No. 1,* and *Lancashire,* is situated about 3½ miles north of Rock Creek Station on the Kettle Valley Railway and adjoins the *Riverside* group of claims. The owners, O. Lofstad and Paul Nelson, of Greenwood and Rock Creek respectively, have leased and bonded the claims to J. W. Clark, of Greenwood. A tractor and one drill compressor have been installed and ore-bunkers, trestle approach, blacksmith's shop, and railway siding constructed. The claims are well located beside the railway and main Kettle river and within 2 miles of the high-power electric line. There is plenty of timber, fir and pine, for all mining and domestic purposes.

Development-work amounts to the following: Upper tunnel, 102 feet of drifts and cross-cuts; lower tunnel, 25 feet below, 155 feet of crosscuts and 35 feet of upraises.

The country-rock in the vicinity of the claims has been termed serpentine locally, and forms a belt, more or less continuous, for several miles. The mineralized zone appears to strike to the north-west and south-east (mag.), dipping from 25° to 60° to the north-east.

Specimens of the ore were sent to the Geological Survey Office in Vancouver and the following observations were offered: "The rock specimen may have been the result of alteration and mineralization of limy rocks or limestone-beds. The gangue minerals include an abundance of quartz and considerable calcite. The greenish mineral plastered over the gangue has the very typical colour of a chlorite mineral and its optical properties bear out this resemblance. It might easily have resulted from the alteration of hornblende, but more probably still is an alteration product of epidote, in which case it may well be the chrome-chlorite mineral clinochlore. The colour is very similar to that of the chrome mica, mariposite, but neither its optical properties nor association resemble this mica. Sulphides present include galena, zinc-blende, and pyrite. From the character of this ore it seems improbable that values in platinum will be found, as these are not the rock types in which platinum occurs."

The ore-bodies developed to date vary from 6 inches to 12 feet, generally forming parallel lenses. Until more development-work has been done nothing definite can be said regarding the width of this mineral-zone, but judging by surface indications it is probably extensive both laterally and longitudinally.

About 250 tons of ore has been shipped to the concentrator at Trail. Samples from the face of the present stope assayed 0.70 oz. in gold, 324.70 oz. in silver to the ton, 16.6 per cent. lead; and 0.30 oz. in gold, 113.40 oz. in silver to the ton, 8.7 per cent. lead, and 7.8 per cent. zinc. It is improbable that the ore will average this in car-load lots, or anywhere near it, unless it is very closely sorted. The appearance of the country-rock adjacent to the mineralized zone and the ore are very similar, and any one unfamiliar with this condition might quite easily sample the waste as well as the ore.

Gold Drop.

This claim, owned by Louis Bosshart, of Greenwood, and situated on the south-east side of Jewel lake, approximately 6 miles north-east of Greenwood, has been systematically prospected during the year. A series of quartz veins varying from 2 inches to 2 feet was uncovered and an attempt made to develop some of them at depth, but owing to the gradual slope of the hill where these discoveries were made it was found necessary to drive crosscut tunnels, which had not reached their objective at the time when an examination was made.

Samples taken from open-cuts and short tunnels assayed as follows: No. 1, 11.40 oz. in gold, 42 oz. in silver to the ton, and 3 per cent. lead; No. 2, 2 oz. in gold, 17.5 oz. in silver to the ton; No. 3, 0.30 oz. in gold, 1.2 oz. in silver to the ton; No. 4, 17.56 oz. in gold, 88.7 oz. in silver to the ton, and 6.9 per cent. lead; No. 5, 2.44 oz. in gold, 16.3 oz. in silver to the ton.

These assays do not represent any tonnage blocked out and the wide variance of values is due to the presence of gold tellurides. Some specimens were shot through and plastered with free gold in a gangue of quartz. Ore of this character is usually "pockety," but not necessarily so, and until development proceeds nothing definite can be reported. A few tons of this high-grade ore carrying from $200 to $400 in gold to the ton soon pays for its extraction, and it is to be hoped that the owner will be able to interest capital in his endeavour to develop the outcrops at depth.

The *Gold Drop* claim lies in a well-mineralized belt and has a wagon-road built to within a few hundred feet of the workings, which will facilitate operations.

CARMI–CRANBERRY RIDGE SECTION.

Cranberry ridge covers a stretch of country about 8 miles long, between Carmi and the mouth of Cranberry creek, below Beaverdell, and forms part of the foot-hills on the eastern slope of the mountain range lying between the Okanagan river and the Westkettle river. (*See* map.)

The formation is mainly quartz diorite, except at the north end, where it is overlain by the Wallace group of rocks, which includes metamorphosed igneous rocks, largely lavas and tuffs, and sediments, all of which have been intruded by dykes which are mainly andesitic in character.

The ore-deposits differ from those found on Wallace mountain, inasmuch as the mineral contents are chiefly pyrite, whereas galena, the principal ore-mineral on Wallace mountain, is only present in small quantities. There is generally a higher gold content in these ores and occasionally chalcopyrite and molybdenite, but an absence of pyrargyrite and tetrahedrite. On some of the claims segregations of galena are found which carry high-grade silver values, but they are not persistent.

Many claims have been staked, leased, and prospected between Carmi and the mouth of Cranberry creek without any commercial tonnage developments being recorded to date. This is due, possibly, to the lack of capital on the part of those interested and their inability without funds to do more than exploit the veins on the surface.

The veins uncovered are very persistent and the values found are such that it seems unlikely that one or more of them should not contain an ore-body sufficiently large to give ample monetary return over and above the expense of mining.

Inyo and Ackworth.

These claims, situated on Cranberry ridge and referred to in the 1923 Annual Report, have been operated by the Dollar Mining Company, with headquarters in Vancouver, during the years 1924 and 1925. A shaft was sunk 140 feet deep on the brow of the hill and crosscuts driven at the 70-foot and 135-foot levels to intercept the vein. On the 70-foot level drifts were driven 35 feet in a southerly (mag.) and 10 feet in a northerly direction on the lead, which strikes S. 15° W. (mag.). On the 135-foot level crosscuts were driven 60 feet in a westerly and 30 feet in an easterly direction without encountering the vein.

An open-cut lying 35 feet to the south of the shaft, on the vein, was produced towards the shaft for a total distance of 70 feet. About 300 feet in a northerly direction from the new shaft an old shaft 40 feet deep was cleaned out and sampled. A drift approximately 130 feet long and 129 feet lower in elevation from the collar of the new shaft has been driven.

Buildings have been erected to accommodate the miners, as well as blacksmith's shop, compressor-house, and shaft head-frame. A rough wagon-road has also been constructed along the face of the hill to Beaverdell for about 2 miles.

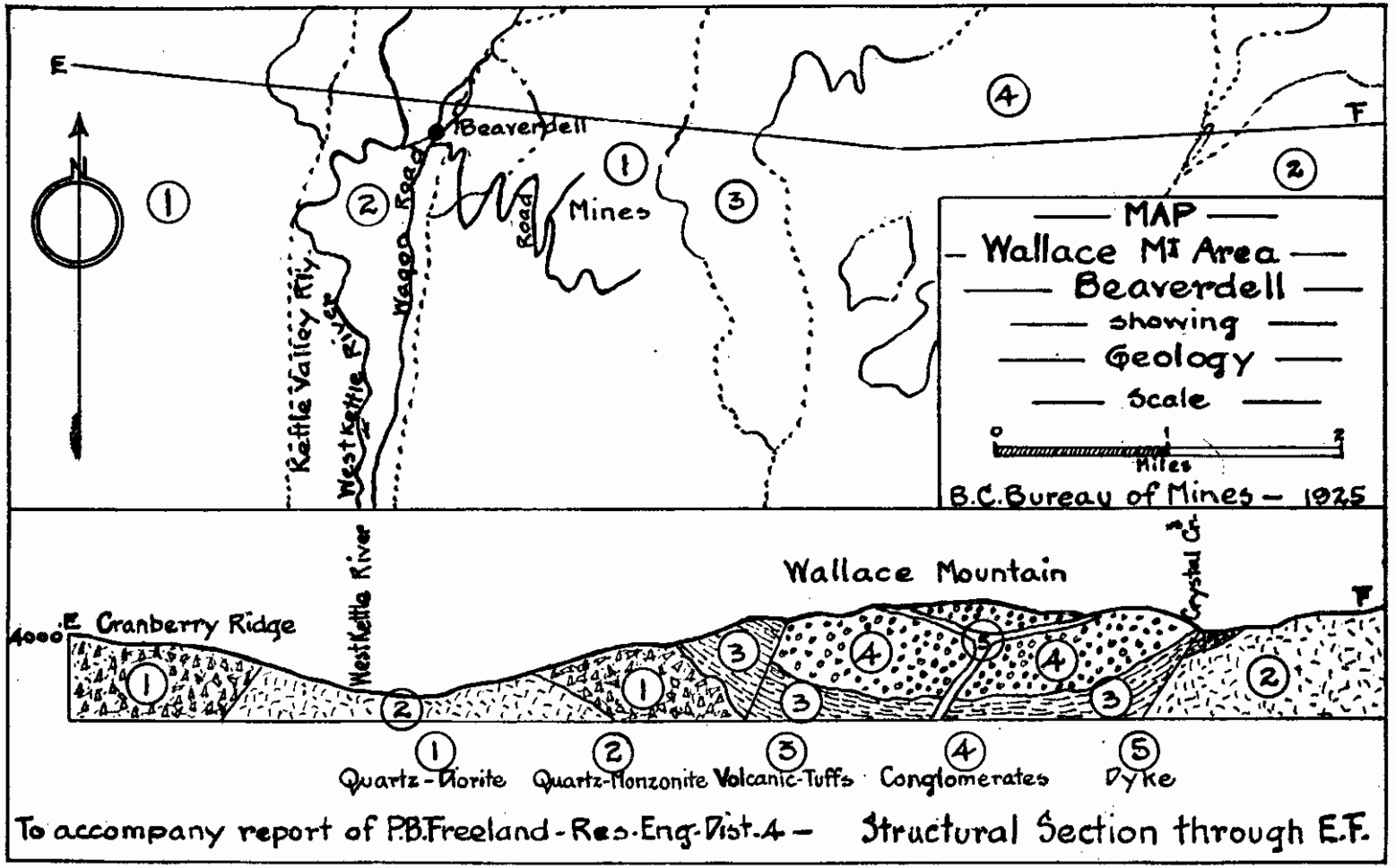
In the deepest shaft the vein varied from 2 inches to 2 feet in width and was persistent for 45 feet, although somewhat crushed and displaced.

The main ore-minerals are pyrite with occasional segregations of galena and zinc. A sample of the pyrite assayed 0.30 oz. in gold and 1.6 oz. in silver to the ton. A sample of sorted lead ore from the main shaft assayed 0.10 oz. in gold, 8 oz. in silver to the ton, and 22 per cent. lead. A sample of sorted ore from the 70-foot open-cut assayed 0.50 oz. in gold, 8 oz. in silver to the ton, 4 per cent. lead, and 20 per cent. zinc.

It will be readily seen that the ore discovered up to date of examination (August 6th, 1925) was not of a high enough grade to stand the expense of shipping and smelting, but that it has possibilities after concentration, providing a sufficient tonnage could be blocked out to meet the expense of construction of a small mill. Considerably higher assays have been obtained from this mine from time to time, but they were evidently specimens or picked samples and did not represent tonnage. A shipment of 14 tons was made to the Trail smelter towards the end of the year. The country-rock is quartz diorite.

Lucky Boy Group.

This group, consisting of the *Lucky Boy*, *Tie*, *Ideal*, and *Glory* claims and situated below and to the east of the *Inyo* and *Ackworth* claims, is owned by Emile Etcheparé *et al.*, of Carmi. Development-work consisting of trenching, open-cuts, shallow shafts, and short tunnels has uncovered four veins striking generally east



To accompany report of P.B. Freeland - Res. Eng. Dist. 4 – Structural Section through E.F.

and west, with a perpendicular dip when in place. Most of this work has been done on the *Lucky Boy* claim, which lies within half a mile from the Kettle Valley Railway, and constitutes 100 feet of trenches, a 30-foot tunnel on the hanging-wall side of the vein, and 40 feet of stripping 20 feet above and on the vein. It is difficult to estimate the exact width owing to the warping of the vein at this point, but it may be safely estimated at 6 feet.

Minerals present are pyrite, galena, zinc-blende, and chalcopyrite containing gold and silver in a gangue of quartz. The ore has been deposited in veinlets and segregations, chiefly on the hanging-wall side of the vein, the remainder being barren quartz slightly oxidized. The country-rocks are quartz diorite, including remnants of the volcanic tuffs.

A sample of sorted ore assayed a trace in gold, 141 oz. in silver to the ton, and 5.3 per cent. copper. There is no tonnage of this class of ore developed, but considering the size of the vein and its apparent persistence, further development-work is to be recommended. On the other claims, where the veins have been uncovered, the ore occurs in small segregations and veinlets carrying variable values.

This group of claims is well located, close to railway transportation and the Westkettle river, with plenty of timber for mining purposes, and offers possibilities to those with plenty of capital who contemplate developing tonnage for milling purposes. These claims are only prospects at the present time.

Nipper Group. This group, consisting of the *Nipper*, *Jubilee*, *Silver Cable*, and *Radio* claims and situated on Cranberry ridge, to the north-west of the *Inyo* group, is owned by Jim Dale *et al.*, of Carmi and Penticton. The *Nipper* claim, on which most of the work has been done, has been exploited periodically for many years on account of some high-grade silver-lead float being found in the gravel overburden. The vein had never been found in place until the last year or so, and then more or less displaced and oxidized.

To develop this vein, which appeared to be 6 inches in width and containing pyrite, galena, zinc-blende, gold, and silver in a gangue of quartz, three crosscuts have been driven; the upper one cutting the vein at 20 feet at an elevation of 4,075 feet; the second tunnel to the east, driven 60 feet at an elevation of 4,025 feet, which did not develop the vein, and the lowest crosscut tunnel driven at an elevation of 3,960 feet for 160 feet, which cut a small vein 2 inches wide containing pyrite, galena, and zinc-blende. It has not been definitely ascertained that this is the same lead as developed on the surface, although the minerals and gangue are similar.

Development on the other claims, consisting of open-cuts, tunnels, and shallow shafts, uncovered oxidized displaced sections of vein-matter well mineralized with galena, pyrite, and zinc-blende.

A sample from the oxidized vein on the *Nipper* claim assayed 0.20 oz. in gold, 26 oz. in silver to the ton, and 32 per cent. lead. A sample from the 2-inch vein in the lowest crosscut tunnel assayed 0.50 oz. in gold, 3 oz. in silver to the ton, 0.5 per cent. lead, and 5 per cent. zinc.

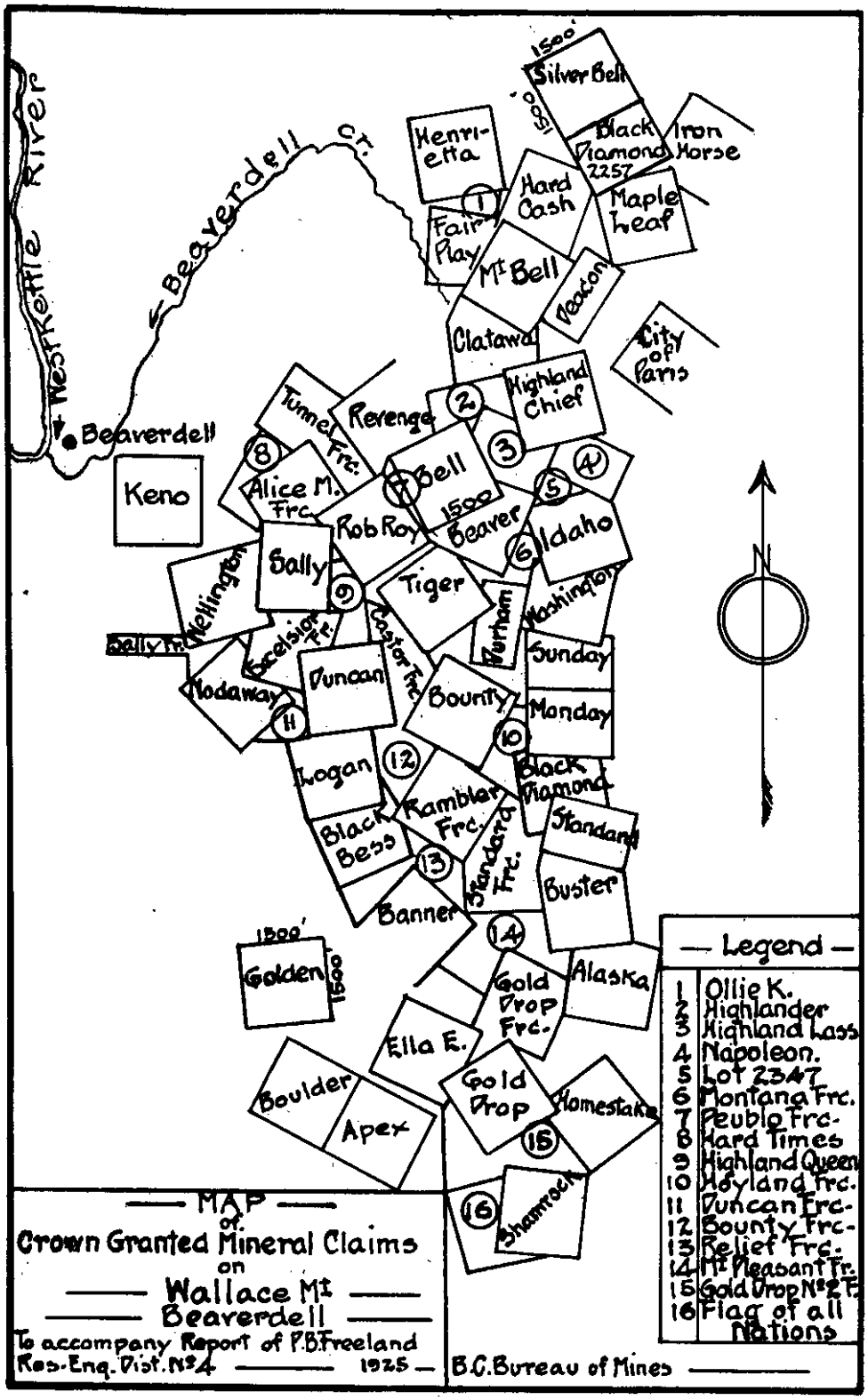
On account of the heavy overburden in this section a study of the country-rocks is difficult, but, judging by the appearance of the rocks where seen, the contact of the quartz diorite and quartz monzonite is not far distant. The strike of the veins is generally in a north-easterly and south-westerly direction.

WALLACE MOUNTAIN.

The country for miles around and centring on Wallace mountain has been subjected to intense prospecting during the past season, the results of which will not be known for some time to come. The boom, slow to materialize on account of the locality having been known for many years, did not reach its zenith until a group of claims, including the *Sally* mine, was bonded by the Federal Mining Company.

Wallace mountain lies on the east side of the Westkettle river (*see* map) and must not be confused with Cranberry ridge, although the formations are similar.

The geology of this section has been reported upon in detail by Leopold Reinecke in Memoir 79, Geological Survey, Department of Mines, Ottawa. A résumé of his general geology shows that the oldest rocks in the district are those of the Wallace group, which consist of a complex of rocks, of which probably over 95 per cent. are igneous origin. The Wallace rocks have been intruded by a batholith of quartz diorite called the Westkettle batholith. Another batholithic intrusion, the Beaverdell quartz monzonite, followed the quarz diorite. This last intrusive magma is believed to have been largely responsible for the mineralization in the district.


Westkettle River
Beaverdell Cr.
Beaverdell
Keno
Silver Bell
1500'
Henrietta
Black Diamond 2257
Iron Horse
Hard Cash
Maple Leaf
Fair Play
Mt Bell
Deacon
Clatawa
City of Paris
Highland Chief
Revenge
Tunnel Frc.
Alice M. Frc.
Bell
Rob Roy
Beaver
Idaho
Sally
Wellington
Tiger
Durham
Washington
Sally Fr.
Excelsior Fr.
Castor Frc.
Sunday
Nodaway
Duncan
Bounty
Monday
Logan
Black Diamond
Rambler Frc.
Standard
Black Bess
Standard Frc.
Buster
Banner
Golden
Alaska
Gold Drop Frc.
Ella E.
Boulder
Apex
Gold Drop
Homestake
Shamrock
N
— Legend —
1 Ollie K.
2 Highlander
3 Highland Lass
4 Napoleon.
5 Lot 2347
6 Montana Frc.
7 Peublo Frc.
8 Hard Times
9 Highland Queen
10 Hoyland Frc.
11 Duncan Frc.
12 Bounty Frc.
13 Relief Frc.
14 Mt Pleasant Fr.
15 Gold Drop No 2 F.
16 Flag of all Nations
— MAP —
of
Crown Granted Mineral Claims
on
— Wallace Mt —
— Beaverdell —
To accompany Report of P.B. Freeland
Res. Eng. Dist. No 4 — 1925 —
B.C. Bureau of Mines

Owing to the present interest in the Beaverdell camp it is considered of interest to quote Reinecke's summarized economic geology, as follows:—

"*Economic Geology.*

"Three types of metallic ore-deposits have been found in the district. They have been named 'mineralized shear-zones,' 'stocks,' and 'contact-metamorphic deposits'; of these, only the mineralized shear-zones have up to the present time been mined at a profit.

"The mineralized shear-zones are found in an area of about 3 square miles on Wallace mountain, at the town of Carmi, and upon Arlington and King Solomon mountains. Nearly $100,000 worth of rich silver-bearing ore had been shipped from Wallace mountain by 1910, and, outside of one shipment from the Carmi mine, this represents the total output of the district up to that date. The shear-zones on Wallace mountain carry values in silver and consist of galena, sphalerite, pyrite, tetrahedrite, and pyrargyrite in a gangue of quartz and sericite; native silver, calcite, chlorite, and kaolin are secondary. At Carmi the ore-minerals are chalcopyrite, sphalerite, and pyrite in a gangue of sericite, quartz, and ankerite. The country-rock is in nearly all cases quartz diorite, for well-defined, mineralized shear-zones are not found in the Wallace group, and in the few places where galena ores are found in the Wallace group they occur in small deposits. Dykes of andesite and aplite are found in the shear-zones and were intruded prior to the formation of the ore. The shear-zones consist of partly replaced fragments of country-rock, quartz, and the ore-minerals, lying between two well-defined walls. They are from 1 to 10 feet wide, strike east and west, and dip to the south at angles varying from 50° to vertical. The ore is partly a replacement of the country-rock, but the greater part of it forms, with quartz, the filling between fragments of altered country-rock in the shear-zones. The order of formation of the minerals in the silver-bearing deposits is sericite, quartz, barite, pyrite; then sphalerite, galena, and tetrahedrite, accompanied by more quartz and pyrite; then pyrargyrite; and, lastly, native silver accompanied by chlorite, iron oxide, and calcite. Sericite has been formed by replacement of the country-rock; quartz and pyrite partly by replacement but largely as cavity fillings; the other minerals were seen only as cavity fillings, never as replacements. Native silver, calcite, kaolin, and iron oxide were formed long after the rest of the minerals. The paragenesis of the minerals in the shear-zones at Carmi and other places was not determined.

"The ore-bodies are tabular in shape and their outlines are largely determined by the closely spaced fault-planes which displace them. They are pockety; that is, they vary rapidly in value in a lateral direction; in certain places they carry as much as $200 to the ton in silver. It is believed that the galena ores on Wallace mountain change in depth to deposits resembling those at Carmi. The ores have been displaced by a great number of closely spaced faults; these strike from north by west to north-east and generally dip to the west. The faults with low dip appear to have caused the largest amount of displacement. The portion of the ore-body east of the fault-plane is generally offset to the south.

"The depth of the zone of oxidation is not great, but surface alteration proceeds farther down along fault-planes. Glacial action is thought to be responsible for the practical absence of oxidized material on the surface.

"The ore-bodies in the mineralized shear-zones were formed by hot ascending solutions derived from the magma of Beaverdell quartz monzonite. Those at Wallace mountain were deposited within a few thousand feet of the surface; at Carmi they were at least 1,000 feet deeper. The country-rocks apparently exerted no chemical influence on the ore-bearing solutions, but the Westkettle quartz diorite, by shearing into well-defined fractures, allowed the ore solutions to pass freely through it and the ore-minerals to be deposited within cavities in the shear-zones.

"The Wallace group, on the other hand, acted as a blanket which stopped the further circulation of the solutions from below. The ores were deposited partly by metasomatic replacement, but more largely by cavity filling. They were preceded by the intrusion of the Beaverdell quartz monzonite in the Eocene and were followed by the north-south faulting which had begun at the end of the Oligocene. They are probably of Eocene age, closely following the intrusion of the batholith.

"The 'stocks' are ore-bodies of indefinite shape which are found in the Wallace group and often carry the sulphides pyrrhotite and pyrite. With the 'stocks' are included all the ore-bodies which cannot be classed as mineralized shear-zones or contact-metamorphic deposits. They, therefore, include ores which have originated in different ways. They are found in various

places in Wallace rocks, the more important being on St. John ridge and in the neighbourhood of the Triple lakes. The country-rock is generally some member of the Wallace group. The ores vary from place to place; they always carry pyrite, and in different places the pyrite is accompanied by pyrrhotite or by chalcopyrite, arsenopyrite, and molybdenite. The gangue is generally quartz, sometimes with calcite and epidote. They lie in masses of quartz or disseminated through belts of sheared rock. The pyrrhotite ores were formed at great depth by hot ascending solutions and they may have been caused by the intrusion of the Westkettle quartz diorite. Others of the stocks may have been formed by hot solutions from the partially consolidated Beaverdell quartz monzonite batholith.

"A 'contact-metamorphic deposit' is found on the *Lottie F.* claim on Copper creek just north-east of the map-area. It is made up of chalcopyrite, bornite, malachite, azurite, garnet, epidote, wollastonite, quartz, calcite, and an undetermined calcium silicate. Bornite and garnet crystallized together and after the formation of epidote. The unknown calcium, iron, manganese, sodium, aluminium silicate occurs as a lining to ellipsoidal cavities in the rock-body. The country-rock is limestone and diorite of the Wallace group. The deposit is probably the result of the intrusion of a large igneous mass below the present ore-body. This mass was not seen, but it is inferred to be Beaverdell quartz monzonite.

"Occurrences of scheelite on Arlington mountain and asbestos on the west side of Hall creek are of interest rather than of immediate value.

"*Future of the District.*

"It is probable that the rich but pockety ores in the shear-zones on Wallace mountain and the lower-grade ores at Carmi may both be mined at a profit. The mineralized shear-zones have been displaced along closely spaced fault-planes and the chief problem in mining is the location of these faulted blocks of ore. Exploration for faulted ore-bodies will probably be costly, but they should be found more easily as the faulting becomes better understood. If enough ore can be found on Wallace mountain it should be possible to mine and transport it to the Kettle Valley Railway at a comparatively low cost. At the Carmi mine the cost of mining will be increased by the cost of pumping from the start of operations. The ores run much lower in value than those on Wallace mountain and mining will have to be carefully done in order to show profits.

"The ores in the 'stocks' and the contact-metamorphic deposit at Copper creek have been prospected but not mined. They are nearly all at some distance from the new railway and their future depends upon the opening-up of larger bodies of ore than have been uncovered so far.

"The non-metallic products of the district have not proved of value up to this date. The discovery of scheelite and asbestos is interesting, but not as yet of economic importance. The altered augite andesites and tuff of the Wallace series will make good road material, and so will nearly all members of the Nipple Mountain lavas."

No positive solution of the faulting system has been worked out to date, but a very fair understanding of general conditions to be looked for underground has greatly assisted those operating.

Bell. The *Bell* mine has been operated by Duncan McIntosh and Pat. Crane for several years until the summer of 1925, when McIntosh bought the Crane interests for a price assumed to be $40,000 and took Henry Lee, formerly an engineer for the Federal Mining Company, into partnership.

Operations continued in a satisfactory way throughout the year and approximately 584 tons of silver-lead ore was shipped to the smelter at Trail. Development-work, consisting of tunnels and up-raises, totalled 1,800 feet, mostly in the lower levels. Extra fuel-oil storage capacity was also added, to do away with the necessity of hauling oil from Beaverdell during the winter months.

The prospects for 1926 are normal as far as tonnage production is concerned; the monetary return to the owners being governed by metal prices, which from all appearances are likely to be sustained.

Sally Group. This group, adjoining the *Bell* mine (*see* map), consists of thirteen claims and fractions and was leased and bonded by the Federal Mining and Smelting Company during the summer. In 1918 a syndicate of eight men from Penticton began prospecting the *Homestake* claim, which lies below the *Sally*, with Robert Wood in charge. No ore was found and the claim abandoned. Later in the year the *Sally* group was bonded and

the syndicate was expanded into a limited company capitalized at $50,000 in $1 shares. Only 10,800 shares were issued, but each represented a dollar, which was put into development of the mine. There was no overhead whatever in the early days of exploitation.

Shortly after work commenced on this group Ed. Nordman and his two sons, as well as one or two others in Beaverdell, became shareholders. Nordman took charge of operations during the summer of 1919 and shortly after an ore-shoot was found on the *Rob Roy*, which was persistently followed. At first this ore was not high grade, but the price of silver ranged over $1 an ounce, which offset the lower-grade material. From that time until 1925 about sixty-four cars of ore was shipped from the *Rob Roy* and *Pueblo Fraction*, which represents a very small wedge of ground lying between the *Bell* and the *Rob Roy*.

The average contents of the ore shipped are about 300 oz. in silver to the ton, 10 per cent. lead, and 10 per cent. zinc; a penalty for zinc was paid to the smelter. The richest car of ore shipped in recent years weighed 102,463 lb. and contained 608 oz. in silver to the ton and 10 per cent. lead.

During the first years of operation all underground work was done by hand and it was only recently that a gas-engine and compressor were installed. The average number of men employed was about twenty-five.

The financing of operations during the first years was difficult, since there was no increase in capitalization, so that it was necessary for the directors to bolster the company's credit at the bank by endorsement. No profits were taken from the mine by the shareholders until the end of 1923, and by that time the properties were paid for and the mine well equipped. During 1924 the net profits were nearly $100,000, of which about $60,000 was distributed to the shareholders. The results up to September 1st, 1925, were about similar to the same period of 1924.

The Federal Mining and Smelting Company assumed control of the properties and equipment on September 1st, 1925, under an option to purchase all the shares of the company at a price that will net the shareholders about $50 a share. Since the Federal Company took hold development-work has been carried on steadily on the *Pueblo Fraction*, *Rob Roy*, and *Sally* and several shipments of silver-lead-zinc ore made to the smelter.

A tunnel is being driven approximately 800 feet below the crest of the hill, with the idea of ascertaining mineral values in the shear-zones at that depth. Should these developments prove satisfactory a fairly large tonnage may be assured for some years to come. The *Sally* group consists of the *Sally Fraction*, *Nodaway*, *Duncan Fraction*, *Excelsior*, *Sally*, *Kid Fraction*, *Highland Queen*, *Alice M. Fraction*, *Hard Times Fraction*, *Tunnel Fraction*, *Rob Roy*, *Pueblo Fraction*, and *Castor Fraction* claims.

Tiger and Bounty. These mineral claims, situated to the east of the *Sally* group (*see* map), were bonded by the Federal Mining and Smelting Company and a considerable amount of surface-trenching was done on the mineralized shear-zones. High-grade silver-lead ore was found and about 30 tons sacked and shipped to the smelter at Trail. Developments at depth are being carried forward at the present time, but results are not available.

Homestake. This claim, situated to the west of the *Wellington* and down the hill, is being developed by S. F. Bradbury *et al.*, of Beaverdell. A great deal of work was done on this claim prior to 1925 by individuals and syndicates, with more or less discouraging results, except in the upper workings, where a shear-zone containing galena, zinc, and pyrite varying from 2 to 8 inches in width was discovered and mined. A cross-fault displaced the ore-body, which had not been found again at the time of examination.

A sample from the sacked ore, which may not be an average, assayed 0.14 oz. in gold, 2.6 oz. in silver to the ton, 6 per cent. lead, and 9 per cent. zinc. The gold values in this sample are not usually found in the silver-lead ores on Wallace mountain. The *Homestake* tunnels are close to the quartz-monzonite intrusive, which may account for the lower silver values.

Revenge. The *Revenge* claim, owned by George Barrett, of Beaverdell, was optioned to Roy Clothier *et al.*, of Victoria, and a considerable amount of development done. This claim, situated to the north-west of and below the *Bell* mine, has shipped several tons of high-grade silver-lead ore in past years.

Recent developments have encountered lower-grade ore-shoots, which is typical of all the shear-zones on Wallace Mountain and does not, as a rule, mean that more high-grade shoots will not be found. Topographically, this claim is well situated.

Wellington. This claim, situated on the south-west side of the *Sally*, was leased and bonded by George Walters, Al. Morrison, and associates, of Greenwood. A tunnel was run about 65 feet below the old workings for 125 feet and the shear-zone formerly mined above was found. A good deal of displacement has been caused by the intrusion of a narrow andesitic dyke 2½ feet wide in the lower tunnel, but the ore-body was picked up in place, although faulted to the south. The ore in the shear-zones on this claim contains a good percentage of tetrahedrite and only a small percentage of pyrargyrite. Five tons of sorted ore was shipped to Trail, carrying over 300 oz. in silver to the ton. This claim has been leased and worked by the owners periodically for many years and small tonnage shipments made from time to time.

Rambler Fraction, Standard Fraction, Bounty Fraction, and Duncan. These claims are grouped under one heading because they were bonded by one syndicate, made up of Penticton and Vancouver interests. The position of this group can be seen on the map. The *Rambler* and *Standard Fraction* are owned by W. Rambo and have been worked off and on for many years and several car-loads of ore shipped to the smelter. The *Bounty Fraction* and *Duncan* lie to the north-west of the *Rambler Fraction* and have also been developed to some extent. This year development has been done on all four claims, especially on the *Rambler Fraction*, without any encouraging results to date. Most of the work was done by hand during the earlier months of the year, which is necessarily slow. In the autumn a 2-drill compressor and engine were installed and work will proceed at a greater rate. Crosscuts were driven on the *Rambler Fraction* with the intention of finding the continuation of the ore-body below the fault in the shaft. This was not accomplished, although what appeared to be two shear-zones containing fragments of ore were cut and drifted on for a short distance. It seems possible that the main fault, which forms a depression running through the centre of the camp and striking in a northerly direction, may have thrown the vein in a westerly and southerly direction over the present crosscut tunnel.

On the *Standard Fraction*, which adjoins the *Rambler* claim on the south-east, only sufficient work was done to hold the option.

The lower *Bounty Fraction* crosscut tunnel, driven many years ago, was extended and lateral drifts driven from it in search of the shear-zone found in the upper workings. Numerous faults were encountered, some of which contained fragments of silver-lead ore in the drag, but the vein was not found in place except for a few feet in one of the old drifts, where it was badly shattered by minor faults. On the *Duncan* more work was done of a similar character, without success.

Because the efforts of this syndicate up to the present time have been more or less futile in a search for ore, it is not fair to the properties under bond to suggest that there is no more ore in them. Mining on Wallace mountain has had a checkered history until a few years ago, and from the first the owners and lessees discovered shear-zones of high-grade silver ore, which netted them several thousand dollars, only to spend it looking for the faulted end, top, or bottom of the vein. Until a considerable amount of underground work has been done and some idea of the faulting system worked out in each locality or claim, much money may have to be spent in unprofitable development. Many tons of high-grade ore has been taken from the *Rambler Fraction*, *Standard Fraction*, *Bounty Fraction*, and *Duncan* in former years, in the same way as it was mined in the *Bell* and *Sally*, and until the deeper zones have been explored on the former group nothing detrimental can truthfully be said regarding the future possibilities.

Beaver. This claim adjoins the *Bell* on the south-east and has been bonded by the same syndicate that controlled the *Revenge* claim, under the management of Roy Clothier. The chief reason for taking over this claim was its situation on the projected strike of the veins on the *Rob Roy*, no ore being in sight at that time on the *Beaver*. The foresight of this move was evident when a high-grade silver-lead ore-shoot was found beside the trail leading from the *Bell* mine to the *Washington* and *Idaho* claims, which lie to the south-east.

The shear-zone is being mined systematically at the present time and shipments made to the smelter. Development consists of shafts, short tunnels, open-cuts, and trenching, and a bunk-house, cook-house, and blacksmith-shop have been built and an engine and compressor installed.

Highland Chief. The original owner of this claim, Jas. Maloney, of Penticton, died two years ago and the claim was taken over by Mark Smith, of Beaverdell. Since that time, it is reported, a syndicate has been formed and the development of the claim is under way. Accommodation for the miners and a cook-house have been erected.

J. Maloney uncovered some high-grade silver-lead ore which occurred in small segregations, but he did not do enough work to block out any tonnage. The development of this claim, which appears to be close to the contact of the quartz diorite and the Wallace formation, is looked forward to with great interest, because the ore-distribution in the Wallace rocks may recur in the other shear-zone contacts to the south.

Washington and Idaho. These claims, owned by Robt. Foreshaw, of Greenwood, are situated directly east and adjoining the *Beaver* claim. The workings consist of shafts, open-cuts, and trenches on a mineralized zone 300 feet long, which is made up of masses or veins of quartz carrying pyrite, galena, and occasional specks of arsenopyrite. The shafts were caved in or filled with water at the time of the examination, so little can be said regarding the veins developed at depth. The surface veins varied from 2 to 6 inches in width and were badly shattered, oxidized, and faulted, which prohibited taking reliable average samples. The deposit appears to be typical of those at present found near the surface of the Wallace group of rocks.

Black Diamond (No. 2798) and Standard. These claims are owned by Pat. Kennedy *et al.*, of Beaverdell. The *Black Diamond* must not be confused with another claim of the same name situated about 7,500 feet to the north on Wallace mountain. A lot of development-work has been done on these claims by sinking shafts, shallow tunnels, open-cuts, and a long crosscut tunnel to cut the vein reported to be in the bottom of the deepest shaft. A syndicate of Penticton men has bonded the claims and is driving the crosscut tunnel ahead in hopes of developing the ore assumed to be in the shaft. The depth of the shaft is reported to be in the neighbourhood of 100 feet and the cost of unwatering it would be comparatively small compared with the expense of driving a crosscut tunnel. By unwatering the shaft those interested would be sure not only that there is ore to drive for, but also that, if there, it has not faulted away from the direction in which the crosscut is being driven, which would necessitate an extension of the tunnel and an added capital outlay. The ore is the usual type found on Wallace mountain.

Gold Drop Fraction, Ford Fraction No. 1, and Ford Fraction No. 2. These claims lie in the most southerly map-area and have been leased, bonded, and acquired by the Kettle River Mining Company, of Penticton, from the owners, Robt. Foreshaw *et al.*, of Greenwood. The directors of the company are D. J. McIntyre, C. W. Nicholl, H. M. Ramsey, J. R. Wells, and Albert Coy, all of Penticton. D. J. McIntyre is president and John A. Greenhill secretary-treasurer. The company has been capitalized for $50,000, divided into 50,000 shares of the par value of $1 each. A cursory examination was made of these claims in 1917, but nothing definite could be reported owing to the workings being caved in. Since that time they have not been seen. The above company has cleaned out the open-cuts, etc., and reported that the lead has been traced for a considerable distance by trenching and that a lower tunnel is being driven on the lead with some measure of success. The ore-minerals are pyrite, galena, and zinc-blende, carrying gold and silver.

Nepanee Group. This group was referred to in the Annual Report for 1917 and in Reinecke's Geological Report, Memoir No. 79; it consists of the *Nepanee, Nepanee Fraction, Nevada, Nevada Fraction,* and *Cobalt* claims, being situated on the south-eastern part of Wallace mountain, close to the *Buster* claim, marked on map. The owner, E. G. Cummings, of Beaverdell, has done a lot of work in an endeavour to follow a quartz vein containing silver and lead which was discovered after the inclined shaft, 70 feet deep, and a 30-foot shaft had been sunk on a zone of shattered hornblende porphyry containing gold, silver, and copper. A sample from this quartz vein taken in 1921 assayed 0.20 oz. in gold, 32 oz. in silver to the ton, 7 per cent. lead, and 14 per cent. zinc.

Owing to the shattered and faulted nature of the ground much difficulty was experienced in following the vein, which has not been developed to any great extent to date. The intense shearing and fracturing of the Wallace rocks in this vicinity is traceable to the close contact of the quartz-diorite intrusive, as well as the injection of porphyry dykes.

CURRY CREEK.

There are several groups of claims on Curry creek, which flows into Beaverdell creek about 2½ miles above Beaverdell from the east side. These claims have lain idle for many years until recently, when the general boom renewed interest in them and some of the old workings were cleaned out and sampled.

Silver Spoon, Last Chance, and Ethel C.

These three claims, situated about three-quarters of a mile up Curry creek from its junction with the main Beaverdell Creek valley, on the north side of the creek, have been explored and developed by Leland Chase and associates, of Beaverdell. When the claims were examined on October 21st an open-cut was being excavated on the *Silver Spoon*, on what appeared to be a lower parallel vein about 2 inches wide and which afterwards was reported to have widened out to 8 inches. A sample of this ore assayed a trace in gold, 1.6 oz. in silver to the ton, and 8 per cent. lead. About 50 feet up the hill and to the east, an old shaft, sunk 15 feet many years ago, on another vein 10 inches wide, was sampled, with the following result: Gold, 0.02 oz.; silver, 11.9 oz. to the ton; lead, 6.8 per cent. The ore-minerals are galena, pyrite, and zinc-blende in a gangue of quartz. The veins strike about S. 76° E. (mag.) and dip 35° north and into the hill.

The formation is a highly metamorphosed volcanic tuff of the Wallace group and the veins conform to its strike. The values found near the surface are not high enough to place this property on the shipping-list, but they are attractive enough to warrant some development at depth.

There are other groups of claims on the opposite side of Curry creek, and a larger group about 4,000 feet east and north which are understood to be promising, but they were not examined owing to shortage of time.

CRYSTAL MOUNTAIN.

A small part of the north end of Crystal mountain is shown on the map beyond Crystal creek and approximately 2 miles east of Wallace mountain, and is made up chiefly of quartz monzonite with remnants of apophyses from the quartz diorite shown close to Crystal creek. Along this contact and for 5 miles in a northerly direction a good deal of prospecting has been going on. Good specimens of silver-lead ore were brought in from the *Crystal Butte* claim by Frank Carey and W. R. Lawrence, owners.

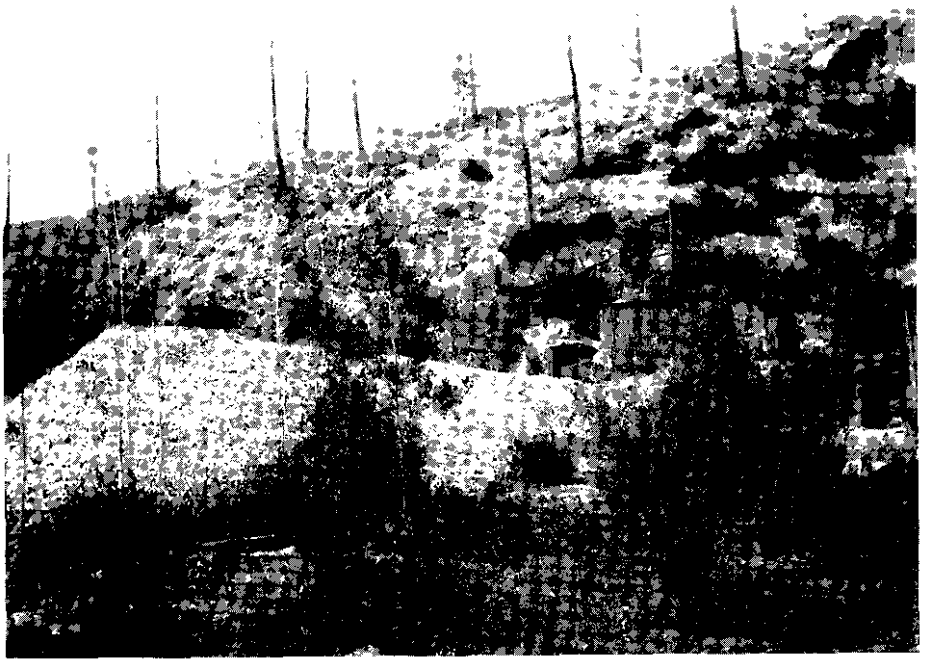
CAMP MCKINNEY.

Very little mining or prospecting has been done in this camp for several years, in spite of the fact that the South Kootenay Power Company built the high-power electric line through the district in recent years.

Eureka and Eureka Fraction.

These claims are owned by J. L. Grant, of Bridesville and Rock Creek, and have been prospected during the year. The *Eureka* was leased from the Government and is 1,500 feet long and 600 feet wide, having been staked many years ago under the old regulations. The *Eureka Fraction* is 1,500 by 1,500 feet, according to the owner. Both of these claims lie on the projected strike of the *Cariboo* mine vein, which was profitably worked about twenty-five years ago for its gold contents. The vein, which varies from 4 to 6 feet, strikes N. 80° W. (mag.) and can be traced for 150 feet in length, is made up of segregations of pyrite and chalcopyrite containing gold and silver in a gangue of quartz.

Development-work consists of trenching and several shafts, the deepest of which is 15 feet, on the *Eureka Fraction;* and one shaft (caved in) reported to be 100 feet deep and another 25 feet deep on the *Eureka* claim. Diversified stories are told regarding what values were found in the 100-foot shaft, which cannot be credited. Samples taken from the dump vary extremely in gold content, which is traceable to the presence of free gold known to be associated with the Camp McKinney ores. The latest developments have uncovered a continuation of the vein in a westerly direction, but no apparently profitable ore-shoots.



D.A. Mine, Greenwood M.D.



Beaverdell, B.C.

OSOYOOS MINING DIVISION.

Horn Silver Mining Corporation.

This company, formerly the British North American Mining Corporation, of Alaska, with offices in the Birks Building, Vancouver, leased and bonded, in 1924, the *Horn Silver* group of claims, situated 6 miles in a southerly direction from Similkameen Station and mentioned in the Annual Reports for 1919, 1920, 1921, and 1923. Early in 1925 a gang of men was put to work in the mine and a shipment of 43.5 tons of ore carrying gold and silver was made to the Trail smelter.

Development-work amounted to approximately 110 feet of drifting on the west tunnel, 100 feet on the east tunnel, with 90 feet of upraises and stoping. No work was done in the mine from August until the end of the year, during which time a new 60-horse-power Petter engine; a compressor, 10- by 10-inch Ingersoll-Rand Class N.F. 1; 3,500 feet of 2½-inch pipe-line from the plant to the mine; a 90-ton ore-bin which feeds into an 18-ton distributing-bin; one Dodge crusher, 7¼ by 11 inches; one set of rolls, 20 by 10 inches; and one Hardinge mill, 4½ by 16 inches, were installed, and constitute the mechanical end of the mill, with a capacity of 15 tons a shift. An all-sliming plant is in course of construction and should be completed and ready to operate early in 1926.

A rough average of values in the ore developed up to the present has been figured at $40 a ton. A composite sample of the ore from the mine assayed as follows: Gold, 0.20 oz.; silver, 37 oz. to the ton; copper, trace; lead, 0.6 per cent.; zinc, 2.5 per cent. Tests were also made for the following: Bismuth, *nil;* arsenic, *nil;* antimony, *nil;* nickel, *nil.*

Under the management of Ed. C. Jacobs, mining engineer, developments are progressing satisfactorily and some financial return may shortly be expected. Specimens of the country-rocks were sent to Dr. Victor Dolmage, Chief of the Geological Survey in Vancouver, who described them as follows: "The dark-grey rock," which constitutes the country-rock in the upper workings, "is a nice fresh acid augite monzonite. The dark-green specimen," which is found in the lowest tunnel, "is over 90 per cent. hornblende and the remainder labradorite, which would make it a basic hornblende gabbro verging on a hornblendite. The monzonite is more capable of producing ore than the gabbro."

Hedley Gold Mining Co.—This company operated steadily throughout the greater part of the year at Hedley and milled 50,870 tons of arsenical-gold ore. A total of 4,025 feet of drilling was done both underground and on the surface in an effort to locate new ore-bodies.

Kingston Group.

This group, including the *Kingston, Warhorse,* and other fractional claims, comprising in all 125 acres and located in the Hedley camp, was taken over by Vancouver interests and a company, called the Metropolitan Mining Company, formed and capitalized for $500,000, with shares at par value of $1 each. As inquiries from time to time have been received from different parts of the United States and Canada, it is apparent that some shares were sold, but evidently not sufficient to commence operations, as nothing constructive was done on the property during 1925.

Juniper and Huntsman Group.

These claims, reported upon in the Annual Report for 1924, were diamond-drilled by the Consolidated Mining and Smelting Company of Canada during the summer, with disappointing results as a whole. Some drill-cores showed values at moderate depth, but the majority were very low grade or blank and proved that the veins did not persist much below the surface.

Peggy Group.

This group, situated near Hedley and reported upon in the Annual Report for 1923, was further developed by the owners during the year. The owners report that a lease and bond has been taken on the group by a well-financed company and the ground will be diamond-drilled during 1926.

SIMILKAMEEN MINING DIVISION.

Mining in this Division, especially in the placer-fields, has been very active this year, resulting in the formation of several companies and syndicates which explored the gravels of the Tulameen and Similkameen rivers. The renewal of operations at Copper mountain and Allenby and development of the silver-lead-zinc deposits at Summit camp has also helped to create confidence.

Allenby Copper Co.

The operation of the *Copper Mountain* mines and the mill at Allenby by the Allenby Copper Company, under the direction of Charles Bocking, general manager, and H. C. Smith, resident manager, was commenced in the early summer. The remodelling-work on the mill was started in May, but no preparatory work was done in the mine until June. Actual milling operations did not commence

until the latter part of August, and since then the operations have been of an experimental nature, requiring a continual change in the flow-sheet. The mine and mill have not been operated to full capacity, but it is hoped a maximum output will be attained in 1926, when the flow-sheet will be more or less fixed.

Improvements outside the mill consist of the completion of a 150-foot Dorr thickener, intended for the purpose of reclaiming water from the mill tailings. Mechanical changes in the mill consist of numerous minor changes in equipment already installed and the addition of standard rake and bowl type classifiers to work in close circuit with the ball and tube mills in the fine-grinding department, screens in the secondary grinding department, and one new blower for furnishing air to the flotation unit.

A total of 122,996 tons of ore was shipped from the mine to the mill and approximately 5,366 tons of concentrates shipped to the smelter at Trail, containing copper and gold.

Princeton Mining and Development Co.

This company's property, situated 4 miles east of Princeton, has been reported upon in the Annual Report for 1922, 1923, and 1924. During 1925 from three to five men were working continuously, with a prospect of a larger number in 1926. Development for the year consisted of drifting 150 feet, three upraises, 30, 30, and 10 feet respectively, and a winze 10 feet on the lower or No. 3 level, and a 50-foot extension of No. 2 tunnel to the south. Recent advice from the management states that, after following the stringer of ore developed last year in the face of No. 3 tunnel for 50 feet, it widened out to about 5 feet of fractured vein-matter, which was made up of feldspar with calcite, talc, and a considerable amount of iron oxide in the fractures, and mineralized with chalcopyrite and pyrite containing gold and silver. A picked sample of this ore assayed 0.03 oz. in gold, 2.60 oz. in silver to the ton, and 12.10 per cent. copper.

Plans for 1926 include a continuation of the No. 3 tunnel and an upraise to connect No. 3 and No. 2 tunnels, also an extension of No. 2 for 250 feet. At the present time the face of the No. 3 tunnel is approximately 700 feet below the outcrop of the vein on the surface, which will give plenty of stoping-ground. The construction of a 50-ton concentrator is being contemplated by the management, but this will, of course, await the results of development and the blocking-out of sufficient ore to pay for the mill, plus some return to the stockholders.

SIWASH CREEK.

E.J.A., B.H., H.J.B., and Owen.

This group of claims, situated about 8 miles up Siwash creek from its junction with 5-Mile creek, is owned by H. H. Avery, H. E. Hansen, Geo. H. Joss, and W. A. McKenzie, of Princeton. Some work, consisting of open-cuts and short tunnels, was done on two veins—one on the *E.J.A.* and *B.H.* striking N. 10° E. (mag.) and dipping slightly to the north-west, and the other on the *H.J.B.* and *Owen* striking N. 40° E. (mag.) and dipping 45° south-east. The widths of these veins vary from 2½ to 6 feet where uncovered and are made up chiefly of pyrite, with small segregations of galena in a gangue of quartz and fragmentary country-rock. Samples across the vein on the *H.J.B.* and *B.H.* assayed a trace in gold and 2.8 oz. in silver to the ton.

A sample of the galena ore on the *E.J.A.* assayed 0.20 oz. in gold, 63 oz. in silver to the ton, and 24 per cent. lead. There is not a sufficient quantity of galena in the ore to represent any tonnage as far as developments have shown, although this condition may change. The country-rock is mainly granite with amygdaloidal diabase rocks in the vicinity of the workings and in which the veins are formed.

The claims are reached by trail approximately 10 miles distant from Jellicoe Siding on the Kettle Valley Railway.

SUMMIT CAMP, TULAMEEN.

The mineral claims in this camp, situated near the headwaters of Amberty creek, which flows into Tulameen river, have been referred to in nearly all the Annual Reports and especially the 1923 and 1924 numbers.

Mary E. Mining Co.

This company, incorporated in the early summer with a capitalization of 2,000,000 shares of a par value of 25 cents each, acquired four claims from W. B. Dornberg and C. Loeb. One of these was originally known as the *Silver Chief* and was formerly held by the Treasure Mountain Mining Company. The original plans of procedure made by W. B. Dornberg, manager, were as follows: That the

Government extend the present wagon-road from Tulameen 2 miles and build a bridge over Eagle creek, and from there the company would widen the present trail to 5 feet where necessary over a distance of approximately 14 miles. A compressor plant and 40-ton flotation unit to be hauled in over the trail were also planned, while after mining and milling the concentrates would be hauled on a 2-wheeled cart, pulled by a horse, to the end of the trail, and from thence on a truck a distance of 8 miles to the railway. These plans were later changed and the management decided to widen the trail from Eagle creek to an 8-foot wagon-road, and contemplates the erection of a power plant at some suitable point to supply electric energy for operation.

The latest report advises that the road has been built to Eagle creek and a bridge constructed, but there is still a few miles of road to be finished between Eagle creek and Summit camp; also that developments in the mine are proving satisfactory. With the installation of a compressor it will be possible to push the development of the mine ahead much more rapidly and, it is to be hoped, block out a sufficient tonnage of ore before constructing a reduction plant. The exposures of galena and zinc-blende in the lower tunnel certainly warrant the capital outlay necessary to prove or disprove the future possibilities of this property.

Eureka. This claim, owned by Andy Jensen, of Tulameen, and adjoining the property of the Mary E. Company, also has merit and is worthy of further exploitation. (*See* Annual Reports, 1923 and 1924.) A good strike has been reported lately on this claim, and also another about 1 mile to the south-west, by Alex. Robinson.

Three Brothers Section.

The Three Brothers mountain-peaks, forming part of the Cascade range of mountains, are situated about 22 miles in a direct line slightly west of south of Princeton and are a landmark in that section of the country. To reach this locality it is necessary to follow the old Trans-Provincial wagon-road for 9 miles south of Princeton, and from there the Hope trail for about 13 miles to a point within a few miles of the summit, where an old trail branching off to the south passes over Nicomen ridge (elevation 6,750 feet, barometric) and skirts the Three Brothers peaks to the south-west, and from thence down into Cambie creek (elevation 4,850 feet, barometric), about 4 miles from its source, making a total distance by trail and wagon-road of 35 miles. Nicomen means knife in Indian and describes the ridge, which is only 4 feet wide in places. Severe storms follow the high ranges in this locality and at any time during the year a snow-storm may make this crossing dangerous for riding and pack horses; consequently it is advisable for any one passing that way to make camp rather than attempt to cross the ridge during a storm.

Should mining developments increase in the neighbourhood of the Three Brothers a much better trail-grade can be found following the Similkameen river. Cambie creek flows into the Roche river, which in turn flows into the Similkameen river. The names "Cambie" and "Roche" have been eliminated on the new maps of this district and they now constitute part of the Similkameen river.

The geology from 9-Mile creek to the summit of the Hope trail has been described by C. E. Cairnes in the Summary Report, Geological Survey of Canada, for 1922, Part A, and need not be repeated here, other than a reference to the Whipsaw Creek area, where he seemed to think that there was every likelihood, from the character and relation of the geological formations, that with intense prospecting other discoveries than those mentioned might be made.

On branching south from the Hope trail near its summit the Tulameen series of rocks are in evidence, including remnants of conglomerate, shale, and limestone pods, intruded by granodiorite and andesitic rocks. Beyond this, about 4 miles distant from the parting of the trail, the bulk of the rocks exposed are granodiorite with occasional limestone-beds associated with mica and hornblende schists, which are heavily impregnated with pyrite. On Nicomen ridge and for several miles beyond, following the trail, the rocks are composed of medium-grained grey arkoses consisting of feldspar and quartz, the latter predominating. They are intersected by numerous porphyry dykes, probably diorite porphyry. The whole mass strikes about S. 10° E. and dips from 30° to 45° to the west. On the rim of the basin forming the headwaters of Copper creek and above the talus-slopes an excellent section of the bedded rocks can be observed. As the trail descends into the Cambie Creek valley, massive grey and light-brown feldspathic sandstones and bedded brown and black shaly rocks, tilted at high angles,

predominate. Except for the hornblende-schists noticeable near Nicomen ridge and segregations of quartz carrying pyrite in the granodiorite, nothing of mineralogical interest was seen. On the west side of Cambie creek and about 5 miles north of its junction with Mamaluse creek the sedimentary rocks form a ridge 1,000 to 1,500 feet in height above the Cambie Creek valley and about 4 miles in length, consisting chiefly of coarse- and fine-grained sandstones, interbedded shales and conglomerates, which strike in a north-westerly and south-easterly direction and dip at a high angle to the south-west. Bonanza and Coldwater creeks, which are tributaries of Cambie creek, flow in a north-easterly direction at right angles to the strike of the sedimentaries, exposing a cross-section for a distance of about 1,500 feet. In the bedding-planes and fractures of the sedimentaries exposed a certain amount of mineralization occurs, consisting of pyrite, arsenopyrite, pyrrhotite, chalcopyrite, stibnite, and zinc-blende containing gold, silver, copper, and zinc. On the same side of Cambie creek the subsoil and weathered rocks are stained with oxide of iron over an area approximately 1,000 feet wide and 3 miles long, showing a probable continuation of mineralization in the sedimentaries for that distance.

Sparkler Group. This group of claims, staked in 1924 by W. S. Wadsworth, Chas. Richter, Steve Mangott, and others, of Keremeos, consists of the *Sparkler*, *Woodland*, *Royal Purple*, *Cambie*, *Silver Star*, *Emma W.*, *Maple Leaf*, *Silver Bell*, and *Gold Bug* and is located on Bonanza and Coldwater creeks mentioned above. Numerous open-cuts and short tunnels driven in the creek-beds and intervening bench-slopes wherever mineralization occurred has exposed a series of veins and lens-shaped ore-bodies, varying from a fraction of an inch to 8 inches in the widest part and coincident with joint-planes and fractures of the rocks and containing the ore-minerals mentioned previously. These developments covered an area approximately 1,000 feet in width and 3,000 feet long. Samples of the ore assayed from a trace to 0.40 oz. in gold, a trace to 0.80 oz. in silver to the ton, and 5 per cent. zinc. In some of the open-cuts the lenses of ore appear to widen with depth, and it is the intention of the owners to develop them about 25 feet below the surface to prove their size and valuable contents.

In the bed of Coldwater creek a small waterfall has been formed by the intrusion of a narrow neck of igneous rock into the sedimentaries. This rock, a basic intrusive, contains a high percentage of dark-green hornblende, with smaller amounts of feldspar, and resembles the description of hornblende diorite given by C. E. Cairnes and placed by him definitely as late Mesozoic or Tertiary in age. The presence of sulphide ores in the diorite, similar in character to those described as being found in the contact sedimentaries on Coldwater and Bonanza creeks, point to a probable genetic connection between the two, and the narrow neck of igneous rock is possibly an apophysy of a larger body of diorite covered by the mass of sediments which form the ridge. A further search for ore-bodies to the north-west of this locality and along the ridge is to be recommended.

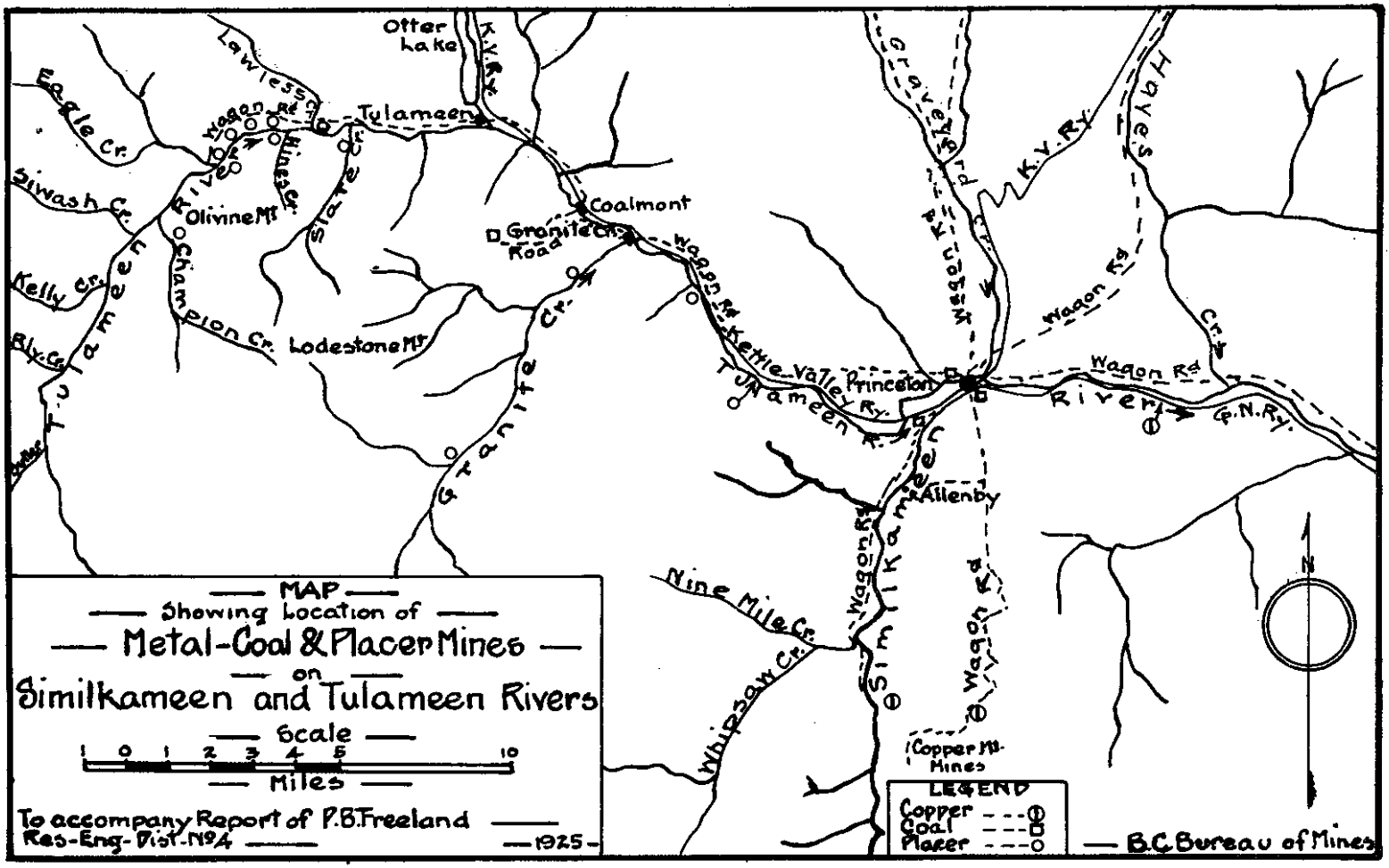
COAL.

Coal-mining operations in the Princeton area continue to be satisfactory, both in the Princeton-B.C. Colliery Company, Limited, and Tulameen Valley coal-mine properties. A new prospect, lying about 2 miles in a direct line south-west of Princeton, on the south side of the Tulameen river, and owned by Robt. Schulli, of Princeton, was developed during the year, with satisfactory results.

PLACER-MINING.

A map showing the location of the larger placer-mine operations on the Tulameen and Similkameen rivers and marked with a small circle is included in this report. In addition to these specified workings, there were many others of a minor character on both rivers, as well as drill-testing of the gravels in the neighbourhood of Princeton. As a whole the results have not been as satisfactory as might be expected, due in most cases to lack of sufficient capital to prospect thoroughly and extensively either the river or bench gravels.

Excavations made in the benches on the north-west side of the Tulameen river above the town of Tulameen have uncovered a condition that is likely to prevail elsewhere in this area, and which points to the probability that there are local concentrations of values by minor streams, but that the main mass of gravel on these benches is of glacial origin which has only been partially sorted. It is evident that these glacial accumulations in the vicinity of Olivine mountain are mainly the results of the erosion of the platinum- and gold-bearing rocks and therefore may be valuable for their metallic contents, but only after thorough investigation and planning of operations on an extensive scale.


Otter Lake
K.V.Ry.
Lawless Cr.
Eagle Cr.
Wagon Rd.
Tulameen
Miles Cr.
Slate Cr.
Siwash Cr.
Olivine Mt.
Champion Cr.
Lodestone Mt.
Kelly Cr.
Bly Cr.
Tulameen River
Granite Cr.
Granite Creek Road
Coalmont
Wagon Rd.
Kettle Valley Ry.
Tulameen
Princeton
Gravel Rd.
Wagon Rd.
K.V.Ry.
Hayes
Wagon Rd.
Cr.
Wagon Rd.
River
C.P.N.Ry.
Allenby
Similkameen River
Nine Mile Cr.
Wagon Rd.
Wagon Rd.
Whipsaw Cr.
Similkameen
Copper Mt. Mines
MAP
Showing Location of
Metal-Coal & Placer Mines
on
Similkameen and Tulameen Rivers
Scale
1 0 1 2 3 4 5 10
Miles
To accompany Report of P.B.Freeland
Res-Eng-Dist-No4
1925
LEGEND
Copper
Coal
Placer
B.C.Bureau of Mines

A great deal of discussion has been heard on the subject of the quantity and value of the black sands found in the bench and river gravels and of mechanical contrivances designed to concentrate these sands economically. Up to the present such machines as have been tried in this locality have proved valueless owing to their incapacity to handle any large yardage of gravel. It is apparent to the observer of conditions in this locality that the black sands are not evenly distributed throughout the gravels, nor do they lie in uniform strata in the river-channels, but seem to be concentrated in long tapering lenses where favourable conditions permit. Therefore, when calculating values to the yard of gravel, it will be safer not to consider the gold and platinum black-sand contents until the ground has been thoroughly tested. In some sluicing operations it was found that the very fine black sands contained little or no values, but that the coarse material was richer, although if carefully panned and rubbed to remove the magnetic coating from the gold and platinum, and all the visible colours collected, that the remnants were not of very great value. These tests were not made over a large area, so they may not be applicable to the whole. It can be readily understood that, in large-scale operations necessitating a final concentration by mechanical means, it will be difficult to clean the coated metallic particles, not amalgamated, unless finely ground, so that the black sands thus saved may be a valuable asset. It might pay the operators to grind finely the magnetic sands and amalgamate rather than ship the concentrates.

Reliable reports intimate that a large area of bench lands on the Tulameen river, between Slate creek and Champion creek, are being taken over by British capital and a thorough preliminary testing of the gravels is to be made to ascertain definitely the value of the ground and the possibility of mining it on a large scale profitably. This would entail the building of a power plant to supply electric energy and the installation of an electric shovel and movable concentration plant, etc.

Numerous individual operations were conducted on the Tulameen river, Granite creek and its tributaries, the results of which are not to hand.

Marks' Lease.—During the year little was done on this lease owing to John Marks, the lessee, being incapacitated by sickness. Heretofore most of the platinum and gold produced on the Tulameen river came from this lease.

Stewart Lease. On this lease, which adjoins the Marks property down-stream, much prospecting was done by sinking a shaft, driving a tunnel, and various open-cuts by a Vancouver syndicate under the management of W. Bagley. A small pump was installed beside the Tulameen river and a small head of water pumped on to the face of an open-cut and the gravel washed over duplicate sluice-boxes and into a black-sand-saving machine. Some difficulty was encountered during these testing operations, due to the cementation of a 6-foot strata of gravel by the limy water from a local spring forming a hard surface near bed-rock, which the head of water would not break down. After several futile efforts to break up this material the attempt was given up. A shaft was sunk, about 400 feet up-stream on the same bench, to a depth of 40 feet, with satisfying results to the lessees, an average of $2 a cubic yard in coarse gold, platinum ($120 an ounce), and values in the black sand being obtained for about 25 feet from the surface. The last 15 feet of gravel excavated produced too low-grade material to be considered as valuable. Expectations of finding higher values before reaching bed-rock were thought probable. A tunnel driven 20 feet from rim-rock into the bench produced some coarse colours in gold and platinum. About 10 feet from the mouth of this tunnel the rock dipped down below the floor of the drift, demonstrating the possibility of a catchment-ledge or old river-channel filled with glacial debris.

Tulameen Platinum Co. Lease. This company, with headquarters at 427 Hamilton Street, Vancouver, acquired two hydraulic leases, each 1,000 feet square, one hydraulic lease 1,500 by 2,250 feet, and one creek lease in the bed of the Tulameen river, making a total of about 120 acres, situated 6 miles up-stream from the village of Tulameen. Operations were commenced on what is locally known as "Schuberts Pool," or what may be better described as a deepening of the river-channel for about 200 feet due to the scouring of the softer bed-rock by flood-waters charged with loose rocks. On the lip of bed-rock and for a few feet down-stream, and also into the channel up-stream, good pay-dirt was extracted in past years, giving rise to the opinion that these values in platinum and gold were the overflow of larger accumulations in the bottom of the channel.

To satisfy themselves, without going to the expense of draining the river, after the high water had subsided the promoters lowered a diver into the channel and discovered a deep layer of water-worn boulders and gravel covering its entire length and breadth, and proving, as far as they were able to tell, that there had been no scouring of the bed-rock below, otherwise the channel directly after high water would have been clean except for minor collections of rocks and gravel.

A camp was established early in the year on the north side and a bridge built across the river below the camp, and later, when the water permitted, a spillway, dam, and sluice-boxes were erected. The mechanical plant consisted of a derrick to which was slung a crate for handling large boulders taken out of the workings, a Potter hoist operating a 1-yard-capacity tram-car for hauling the gravel and dumping it into the sluice-boxes, and a small pump to withdraw the seepage-water. The amount of material moved was about 50 yards a day of ten hours and from 100 to 150 yards of boulders. The sluice-boxes were both riffled, screened, and undershot with wide riffles to catch the black sand, and a mercury-trap. No exact figures of the amount of platinum and gold recovered have been published, but the results were generally understood to be unsatisfactory.

A theory advanced by one of the owners, which has much to recommend it, is that owing to the channel being filled and packed tightly with boulders and gravel it formed a false bed-rock so close to the surface that practically all the precious metals brought down during high water were swept over it, to be deposited in wider areas down-stream. An attempt to mine the benches above the river on the north side will probably be made in 1926.

Similkameen Placer Syndicate.

This syndicate was formed in Vancouver, with E. M. Morgan as secretary, to acquire four placer-mining leases situated, one lease on Whipsaw creek, one on 9-Mile creek, flowing into the Similkameen river above Princeton, and two leases half a mile up Slate creek, which flows into the Tulameen river. (*See* map.) The work done on Slate creek, under the supervision of Norman McCormick, consisted of driving a tunnel 200 feet, commenced 125 feet in from the mouth of the old tunnel driven by C. F. Law below the first falls in a westerly direction and under the present channel of the creek. The idea of doing this work is that the old channel crossed the present one only a short distance above where the tunnel will break through bed-rock, giving the operators an excellent opportunity to explore the ground. A shaft sunk 35 feet in depth about twenty years ago, and lying directly in line with the present tunnel, is said to have contained good values, but the workers were driven out by a superabundance of water. A dam and flume were also built by McCormick to carry off all surface waters, and the tunnel below is expected to tap the seepage, which will pass over the riffles to be built in the tunnel. The old channel-mouth has been blocked by an enormous deposit of glacial debris, which deflected the creek to the north and over the present falls. These two leases on Slate creek are considered to be extremely good prospects. A shortage of water stopped work until next year. The camp has been built about three-quarters of a mile up Slate creek from its mouth and can be reached by trail from across the Slate Creek bridge.

Development on the *Whipsaw* and *Nine Mile* leases was not reported and the claims were not examined.

National Holdings, Ltd.

This company, with headquarters in the Board of Trade Building, Vancouver, and under the superintendency of E. S. Estlin, owns seven placer leases, as well as two creek leases of the Tulameen river-channel. Three of the leases underlie what is locally known as the Ferguson ranch, the freehold of which land the company purchased outright; the other four leases are situated in the western end of the valley, making a continuous belt of alluvial and morainal ground, consisting of river-flats, benches, ravines, and other gravel-deposits. The two creek leases, consisting of 1 mile of the present river-bed, adjoin the placer leases. All the placer leases are 500 yards wide at the river-front and 750 yards long, and are granted for twenty years subject to renewal under the provisions of the Act.

These properties lie along the Tulameen river, about 2½ miles up-stream from Princeton, where the valley widens out to approximately half a mile. The inlet and outlet of this area are hemmed in by narrow gorges of igneous rocks and form natural necks to the catchment-basin. The Kettle Valley Railway and the Government wagon-road traverse the north bank of the river at this point and solve the transportation problem.

The plant installed during the year is as follows: A complete drag-line gravel-handling plant, including a steam double-drum hoist, a 1½-yard Sauerman bucket, a 73-foot tower, cableway with 1½-inch cable, carriers, blocks, sheaves, and guy-lines and screening-apron; a pumping plant with a capacity of 1,500 gallons a minute; one-half mile of wooden flume; a line of 4-foot heavy sluices paved with square block riffles; a concentrating plant having a capacity of 50 tons of sand a day and consisting of a No. 14 Wilfley table and bucket elevator, pulleys, shafting, etc., and a 4-horse-power crude-oil engine; a fully equipped electric-light plant for camp and night-work; a telephone-line to connect with the Government system between Princeton and Tulameen, etc.; a separate pumping unit for handling the water from the diggings; besides camp buildings to accommodate twenty-four men, living and office quarters for the superintendent, blacksmith-shop, and storehouse.

The process of handling the gravels is effected by means of a large drag-line scraper, which is slung to a carrier running over a track-cable. This cable is stretched between a heavily constructed wooden tower and guyed with steel cable at the dumping end, and is securely anchored in the ground at the other. The bucket or scoop attached to the carrier runs from the tower to the anchorage by gravity, being controlled by a cable attached to the donkey-engine, and is hauled back and up by the load-line which passes through a sheave at the tower-head and down to the main drum of the engine. The bucket, weighing 2,800 lb., has teeth in the lower lip which enables it to dig into the gravel, and when filled is raised by applying tension to the track-cable, which lifts it through the air to the tower, where it is automatically tripped, discharging its load into the dump-apron, which screens off the larger stones and allows the finer material to drop into the sluice-head. Water pumped through half a mile of flume carries the gravel over block riffles (11½ inches square and 1⅛ inches apart) to the tail-race, where it is dumped into the river. In its course down the sluices the finer sand passes through a fine grating and on over the undercurrent, which spreads out the stream over steel-capped riffles, amalgam-plates, and blankets. After leaving the undercurrent the sand-stream is caught in a trough and diverted to a bucket elevator, which carries it up to a rotary screen, where a further separation is effected. The fines are then carried down to a No. 14 Wilfley table and separated by gravity. The capacity of this plant is 1,000 cubic yards every twenty-four hours.

Owing to the delay in delivery of a specially riffled Wilfley table the company was not able to operate this part of the plant before the "freeze-up," but the black sands taken from the main sluice after the removal of the riffles assayed as follows: Gold, 7.33 oz. to the ton, valued at $146.60; platinum, 1.17 oz. to the ton, valued at $138.06; gross value to the ton of 2,000 lb., $284.66.

This material came from the river-flats. More test-pits and shafts are going to be excavated as soon as the weather permits, and if the results continue to be as encouraging it is more than probable that the company will install another Sauerman drag-line scraper and two hydraulic units for bench-work. The two drag-line pits dug during the season revealed the fact that large boulders were almost absent, which is a most essential feature to successful operations with this type of plant. The bed-rock is sandstone.

It is the intention of the company to concentrate the magnetic sands and ship them to the smelter. This will probably mean a long haulage to a smelter that handles this class of material and which pays for all the metals of the platinum group. It might pay the company, if they have not already done so, to make tests for fine-grinding in case the values in the sands are coated metals that once freed would amalgamate, and, leaving the residue comparatively valueless, would thus eliminate both smelting and transportation, which are high cost factors.

Thanks are due to E. S. Estlin, superintendent, for much information and many courtesies accorded.

Similkameen Gold and Platinum Dredging Co., Princeton.

This company of English capitalists was formed, under the superintendency of H. G. Nichols, for the purpose of examining and prospecting the economic dredging value of certain creek and bench leases situated for a distance of about 3 miles up the Tulameen river and 5 miles up the Similkameen river from their junction below Princeton. A total of forty-three test-boreholes were put down to bed-rock by a steam-driven Star drill with a 6-inch casing and numerous shafts and test-pits dug. Most of the work done on the Tulameen river was within 2 miles of Princeton, up-stream, and within 3 miles from that town up the Similkameen river, in certain places decided upon as being representative of the whole of the ground held by the company.



Sally Mine, Greenwood M.D.



Rambler Mine, Greenwood M.D.

As the results of this prospecting have not been published, it is impossible to record the findings, although the fact that nothing has been done, either towards further examination or actual operations, indicates disappointing conclusions. It may be expedient for those interested to remember that to offset the initial cost of a dredging plant, which might run up to $200,000, it is necessary to explore and be sure of a large area of gravel containing values sufficiently high to pay for that plant as well as give some profit to the investor. If the gold and platinum lie in certain narrow channels in this area, as proven elsewhere, it probably could not be worked profitably by dredging, but a lower-cost machine (say of $50,000), such as a Bucyrus shovel, might be worked to advantage.

EASTERN MINERAL SURVEY DISTRICT (No. 5).

BY A. G. LANGLEY, RESIDENT MINING ENGINEER.

(Reports marked * are by B. T. O'Grady, Assistant.)

The Eastern Mineral Survey District (No. 5) covers East Kootenay, comprised of Golden, Windermere, and Fort Steele Mining Divisions, and West Kootenay, which includes the Ainsworth, Slocan, Slocan City, Nelson, Arrow Lake, Trail Creek, Lardeau, Trout Lake, and Revelstoke Mining Divisions.

INTRODUCTORY REMARKS.

The stability of the metal market for lead and zinc, together with the immense production of the *Sullivan* mine, have been important factors in attracting the attention of British and American interests to the potentialities of this district during the year 1925. The direct result has been the establishment of local field organizations by two strong British companies in order to acquire mining properties of merit; a number have been taken up, at which mining activities are now in full swing. Many prominent American mining engineers visited the district and probably more examinations were made than during any previous year in the history of the Kootenays. The Consolidated Mining and Smelting Company has also had engineers in the field as well as prospectors. Mining companies, now realizing that developed properties are getting scarce, are in most cases prepared to undertake the exploration and development of prospects and are offering equitable terms to the owners.

This evidence of available capital for the acquisition and development of mining properties has been an incentive to prospectors and others interested in mineral claims to increase their activities in the field, and already has been reflected in a decided revival of mining throughout the district.

LEASING.

As usual, the activity of leasers has been responsible for a considerable tonnage of high-grade silver-lead ore. These operations have been principally confined to the Slocan and Ainsworth Mining Divisions, which areas are both easily accessible and contain numerous deposits of high-grade ores. Among the leasers may be found some of the most expert miners in the district; they take hold of a property, generally when company operations have ceased, and generally make good money. In some cases they have been responsible for bringing abandoned properties back to life, and their work might almost be considered of equal importance to that of the prospector in the advancement of the industry.

PROSPECTING.

There were more prospectors in the hills than in 1924, but not nearly as many as are needed or conditions would appear to warrant. However, with the present demand for properties, it is anticipated there will be an increase in prospecting activity in the near future. Most of the work was confined to old discoveries, no new discoveries of known importance having been reported. Forest fires, which were exceptionally bad owing to the dryness of the season, hampered operations in the hills of the prospector, small operator, and examining engineer.

NEW MINING DEVELOPMENTS.

Among the numerous new developments, the following may be mentioned as some of the most important: The reopening of the *Bluebell* mine, which again has entered the shipping-list with a large tonnage to its credit. The *Lucky Jim* also shipped a large tonnage and again promises to be a substantial producer after a period of inactivity. The *McAllister* mine has been placed on a producing basis after a long campaign of development. Work during the year at the *Whitewater* has met with encouraging results and it is anticipated steady shipments will be made during 1926. Recent developments at the *Van Roi* give rise to expectations that this property will show an increased production next year. The long crosscut at the *Ruth-Hope* reached its objective and conditions appear favourable for the property becoming one of the important producers of the Slocan.

Important exploratory work is being undertaken by the Victoria Syndicate at a number of properties and likewise by the Porcupine Goldfields Development and Finance Company. This latter company has been carrying on systematic development of the *Stemwinder* and *North Star* properties, in connection with which work the Swedish electric prospecting methods have been used for the first time in British Columbia.

CONSTRUCTION.

Preparations were started for the enlargement of the *Sullivan* concentrator to a total capacity of about 4,000 tons a day. The new power plant of the West Kootenay Power and Light Company at Bonnington was completed.

Large extensions were made to the Consolidated Mining and Smelting Company's reduction-works at Trail, including the doubling of the capacity of the zinc plant, increasing that of the lead-refinery to 325 tons a day, the erection of a new concrete stack 409 feet high, and other important additions to the work.

MARKETING FACILITIES.

Better marketing facilities are now afforded by the Consolidated Mining and Smelting Company than ever before. The base rate for lead ores is now $8 a ton, and the penalty for zinc has been reduced to 20 cents a unit for all zinc contained, while a credit of 7 cents a unit for silica and lime is allowed. The rates on zinc ore have also been decreased. The acceptance of customs ores by the company for concentration, however, is by far the most important innovation, which not only has given an impetus to mining, but has been a boon to many an operator. Among the properties taking advantage of this facility, the following may be mentioned: *Bluebell, Ruth-Hope, Lucky Jim, Enterprise,* and *Cork-Province.*

GEOLOGICAL SURVEY WORK.

The Geological Survey had a party in the Slocan under C. E. Cairnes; two parties were in the field in the Windermere Division, one under J. F. Walker and the other under C. W. Evans.

CONCLUDING REMARKS.

During the season a large proportion of the time in the field was taken up by investigating road and trail requirements to various properties and many mine-owners and prospectors benefited by assistance given under the "Mines Development Act," although no very large expenditures were necessary. The revival of interest in mining resulted in an exceptionally large amount of correspondence to be dealt with in connection with inquiries, applications for examinations, and departmental business, which necessarily absorbed a considerable portion of the time available for field-work.

The year 1925 ended with a feeling of optimism and, judging by all indications, the district faces during 1926 a year full of possibilities and with a greater production almost assured.

The writer wishes to acknowledge the courtesies extended by the mine-owners and prospectors throughout the district.

GOLDEN MINING DIVISION.

The area covered by this Mining Division embraces an immense tract of mountainous country, including to the west of the Columbia river the northerly section of the Purcell range, the southern portion of which, in the Fort Steele Division, has been productive of the great deposits of the *Sullivan* and *St. Eugene* mines, while the *Paradise* and many prospects have been discovered in the Windermere Division, lying between the two Divisions.

This mountain system between Fort Steele and the main line of the Canadian Pacific Railway has not, as far as is known, been completely covered by the Geological Survey, although it is anticipated that additional reports will be available at an early date. However, it is understood that the Golden area is underlain by rocks of the Cambrian and Pre-Cambrian periods, of which limestones, schists, and quartzites predominate.

Prospecting was probably more active in the nineties, when a number of claims were staked in this area, but in few cases have there been any serious attempts at mining and much is left to the imagination as to what further development below the shallow surface diggings of many a prospect may lead to. In this connection it must be remembered that when these properties were first prospected, transportation and marketing facilities were not nearly so favourable as they

are to-day; for it was not until 1915 that the Kootenay Central Railway, connecting the main line of the Canadian Pacific Railway at Golden with the Crowsnest branch at Cranbrook, was completed.

That part of the Golden area tributary to the Columbia river and lying to the north of the main line of the Canadian Pacific Railway was also penetrated by the prospector of the early days and a few claims were staked in the country surrounding Kinbasket lake and Blackwater and other creeks. On the eastern side of the Columbia the area extends to the boundary of Alberta, which corresponds to the Great Divide of the Rocky mountains. Strange to say, the most important mine in this Division, and the only metalliferous mine in the British Columbia section of the Rockies which has produced any appreciable tonnage of lead-zinc ore, lies in this area—namely, the *Monarch* mine at Field. Besides this deposit and one of a similar character on the opposite side of the valley—namely, the *Kicking Horse* property—there are mineral indications south of the Canadian Pacific Railway on the Ottertail river, Moose creek, and Ice river. The Ice River area is particularly interesting from a geological point of view on account of the large intrusion of alkaline feldspar rocks, in which group occur many rare elements, although of no great importance commercially. This mass of igneous rock, known as the "Ice River Complex," is the only exposure of igneous rock in this portion of the Rocky mountains, and as the only known ore-deposits in this section have been discovered in the surrounding country, it seems logical to assume that they are genetically connected with the intrusion; the suggestion that it is more extensive at depth than surface exposures would indicate is therefore not untenable. (Refer Geological Survey, Canada, Memoir 55.)

During the season the Department received news from a prospector of a body of magnetite and some titaniferous ore at the head of Moose creek. A sample of some of the latter material submitted by the prospector, upon analysis, proved to be knopite. This mineral is essentially a titanate of lime with lesser quantities of iron. Cerium and yttrium are also present in amounts varying from 3 to 4 per cent. It is possible that if this mineral is available in very large quantities it might be worked for titanium. Unfortunately time did not allow an examination being made during the year, but it will probably be visited early next spring.

Monarch. Late in the fall of 1925 this property was taken under option by the Pacific Mines Development and Petroleum Company, of which A. B. Trites, of Vancouver, is president. The deposit was discovered in 1885 and has been worked intermittently by various interests since that date. Although a large tonnage has been extracted, it is doubtful if any substantial profits were realized during its main period of production, which took place at a time when metal prices were low and marketing facilities were not nearly so favourable as they are at the present time. Further, by the application of modern milling methods a better separation and saving of the metallic constituents of the ore should be obtainable than was possible with the equipment the mill contains.

The ore is a mixture of lead, zinc, and iron sulphides with low silver values. It occurs as tabular replacement deposits in a dolomitic limestone of Cambrian age. The mineralization has taken place along and adjoining well-defined fissured zones which have a northerly and southerly trend; cross-fracturing has also had a favourable influence on the formation of the ore-bodies. The ore lies on a massive foot-wall of dark limestone, which has a strike of about N. 32° W. and dip of from 20° to 28° to the east, and forms a definite geological horizon in the precipitous bluffs on either side of Kicking Horse valley.

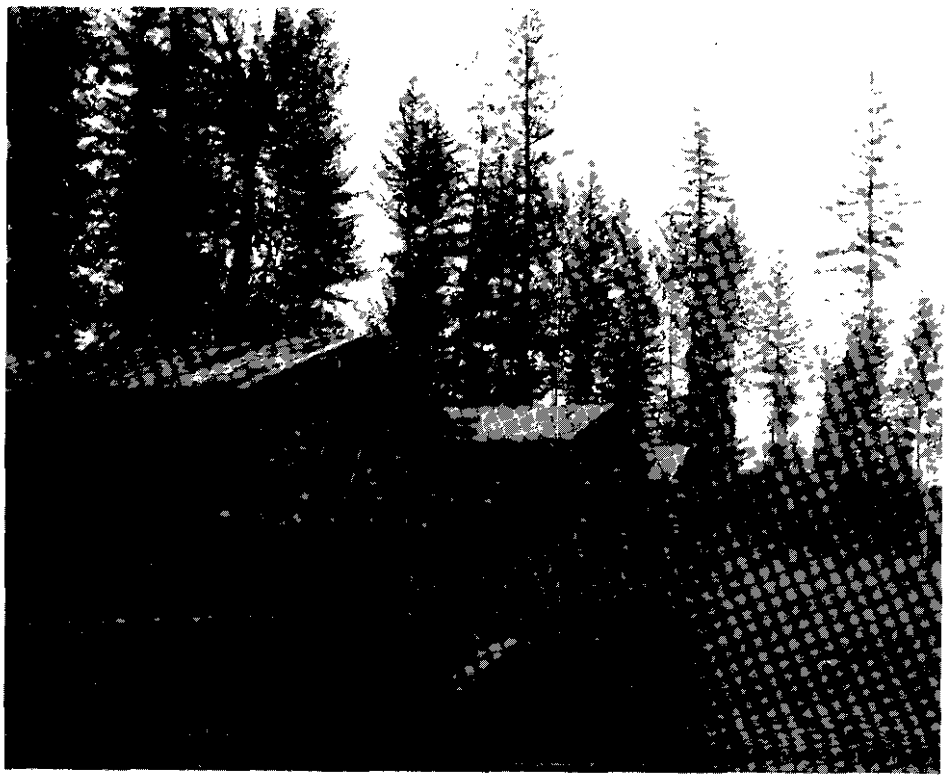
The northerly and southerly fissures, around which the known ore-bodies have been found to exist, can be traced downwards from the top of the ridge to the band of dark limestone, where they cease, and for 1,000 feet below this to the valley-floor no fissuring is noticeable and no ore has been found—an interesting phenomenon, which suggests the presence of other ore-bodies on a similar horizon. Other fissures bearing a resemblance to those at the *Monarch* can be seen cutting the bluffs to the west, but cannot be examined on account of the precipitous nature of the mountain.

More recent development has been confined to the mining and development of an ore-body lying at a distance of about 700 feet to the west of the old workings; this is now known as the *West Monarch*, formerly being called the *Couverape*, and thought to be outside the *Monarch* holdings until a survey proved it to be otherwise.

The workings, here consisting of one large pillared stope with some crosscutting and drifting, are reached by a narrow trail around the bluff, from which about 100 feet of ladders form the



Paradise Mine, Windermere M.D.



Grotto Mine, Windermere M.D.

connecting-link. The mineralization is extensive and systematic development was being proceeded with in an attempt to block out sufficient ore to warrant the installation of necessary equipment for handling and treating the ore.

On account of the topographical features no waste can be dumped from the mine-workings, as it would fall sheer down for about 1,000 feet and land on the main line of the Canadian Pacific Railway; hence it has to be handled by a short length of tram, dumped down a raise, and drawn out from below.

A 700-foot incline raise connecting the old workings with those of the *West Monarch* is contemplated for next year. This will greatly facilitate the handling of ore and waste, as well as giving better access to the workings. Operations have been temporarily suspended for the winter months.

References.—Geological Survey, Canada, 1912, p. 175; Annual Reports, 1912, p. 139; 1915, p. 80.

Kicking Horse. This property, which was acquired by the Pacific Mines Development and Petroleum Company, is situated on the north side of the Kicking Horse river at a point opposite the *Monarch* mine. The geological conditions and character of ore-deposits are similar to those of the latter property. The camp-site is immediately below the workings on a gravel-bar of the Kicking Horse river. Good buildings have been erected, suitable for the accommodation of twenty or thirty men. A steam-driven air-compressor supplies the necessary air for drilling and for the operation of a small hoist for hauling supplies up to the workings by means of a steel cable.

The mine-workings are situated in the face of a bluff at an elevation of approximately 1,000 feet above the river or 5,300 feet above sea-level. Several adit-tunnels and crosscuts indicate the presence of a considerable tonnage of low-grade lead-zinc ore occurring in tabular-shaped ore-bodies similar to those developed at the *Monarch*. The average values could only be ascertained by extensive sampling, but the bulk of the tonnage so far developed is claimed to be of fair milling grade.

Development at both properties was under the direction of A. W. Davis, who had a crew of twenty-five or thirty men employed during the latter part of the year. Operations have been suspended for the winter, but it is understood that development will be energetically pursued in the spring, and if results come up to expectations the installation of a concentrator is contemplated. The property was formerly called the *Black Prince*. (Refer Memoir 55, Geological Survey, Canada, 1914.)

Other activities in the Division were confined to prospecting and minor operations, among which may be mentioned the following:—

The *Rothschild* claim, which adjoins the *Giant* group on the Spillimacheen river, was worked by J. P. Farnham with a small crew of men and a few tons of silver-lead ore was shipped to Trail. The *Rose* group, belonging to R. McKeeman, of Castledale, and associates, was bonded to W. E. Narkaus and A. J. Anderson, who, it is understood, let a contract for the driving of a 200-foot crosscut tunnel in order to explore the deposit at greater depth. This property was formerly called the *I.X.L. & Condor*. (Refer Annual Report for 1918, p. 153.)

A number of properties were examined by visiting engineers and it is anticipated that next season will witness increased activity among the outlying properties in various sections of the Division.

WINDERMERE MINING DIVISION.

The season has witnessed the usual amount of activity among the mines and prospects. Development at various properties has been satisfactory and points to production being well maintained during the coming year.

Paradise. Steady shipments were made during the year, mining and development being carried on by a crew of twenty-five men under the direction of R. McDonald. The ore shipped was the usual "sand carbonates" carrying from 30 to 40 per cent. lead, with about an ounce of silver to the unit of lead. The high price of lead has obviated to a certain extent the careful sorting and selective mining previously necessary to obtain a marketable product.

The primary ore of this mine was undoubtedly a mixture of lead, zinc, and iron sulphides and occurred as a replacement deposit in limestone between slate and quartzite. Subsequent movement crushed and sheared the vein-matter, which then became subjected to the action of

surface waters, resulting in the leaching-out of the zinc, most of the iron, and leaving as a residue the material called "sand carbonates." During the process of leaching this material accumulated in pockets along the bedding-planes, joint-planes, and in cross-fractures, forming irregular-shaped and disconnected ore-bodies, some of which are of considerable dimensions. There appeared to be, at the time of examination in the fall, a good tonnage of ore available, but on account of its mode of occurrence an estimate would be guesswork.

The tonnage of this residue, or oxidized and leached ore, which has been extracted from this mine would indicate the existence at one time of a primary ore-body of no mean dimensions and suggests possibilities for its existence below the horizon of oxidation, also beyond the limits of the crushing movements. The irregularities in the shape and size of these bodies of carbonate ore have made it extremely difficult to ever block out a reserve tonnage.

The methods employed have been to mine out one pocket and then look for another, taking advantage of the information gained in the process of actual mining. This hand-to-mouth method has been productive of satisfactory results; more ore has always been found when one pocket becomes exhausted and a steady production maintained over a period of years.

Recent work between the third and fourth levels has exposed a strong showing of primary sulphide ore, the development of which may be of great importance to the future of the mine. When examined the ore was exposed in the face of an intermediate drift, 90 feet above the fourth level. Crosscutting at this point exposed a width of 24 feet of vein-matter with one wall still in ore. A sample taken over a length of 12 feet gave the following returns: Silver, 14.3 oz. to the ton; lead, 16.9 per cent.; zinc, 23.2 per cent. Geological conditions appeared favourable for the occurrence of a considerable ore-body in this section of the mine-workings and further development will be watched with interest.

The ore is hauled to the railway, a distance of 19 miles, by a White motor-truck, each load weighing about 2½ tons. One and a half trips a day are made, which is a good average considering the difference in elevation between the mine and the railway is 4,500 feet. During the winter the ore is hauled by sleigh to Toby creek; thence by motor-truck for the balance of the distance. Further reference may be seen in the Annual Reports for 1903, 1915, 1917, and other years.

SLADE CREEK.

White Cat. This property was operated by the Galena Ghat Mining Company during the summer months; unfortunately work on the road and the property was interrupted by the withdrawal of men to fight forest fires, which were general throughout the district, due to the exceptional dryness of the season. However, in the short time at its disposal the company succeeded in mining and hauling 81 tons of silver-lead ore to the railway, over a distance of about 24 miles.

The road to the mine was greatly improved by assistance given by the Department of Mines. Owing to the difficulties of operating and keeping the road in condition during winter months the property was closed down until the spring. About ten men were employed under the direction of R. Morland. The property is described in the Annual Report for 1923.

Among other properties on Slade creek now lying dormant may be mentioned the *Relief* and *Sitting Bull* groups as being worthy of investigation with a view to leasing or exploration during the summer months. In this connection it may be pointed out that when these properties were formerly worked some few years ago there was no road up the creek and ore and supplies had to be packed for a considerable distance.

HORSETHIEF CREEK.

Grotto Group.—Prospecting and exploratory work were carried on during the season with a small crew of men. No information is available regarding the results of the season's work.

Maverick. This claim is located at a low elevation on Horsethief creek at a distance of about 1 mile east of the *Grotto*. Some years ago a small shipment of silver-lead-zinc ore was made. The ore was extracted from a deep open-cut run along the strike of a sheared fracture in limestone. Apparently the occurrence was in the form of a small pocket as there is little evidence of vein-matter left. A crosscut tunnel has been started by W. Nixon and partner to prospect the westerly extension of the fracture. The presence of iron-stained float on the hillside above the fracture indicates the advisability of more surface prospecting in this direction.

Puzzle Group.

This property, located a short distance to the west of the *Grotto*, is owned by J. McCullough, of Radium Hot Springs, and E. J. Morigeau, of Wilmer. Prospecting over a fairly wide range of the mountain-side by Morigeau has resulted in the discovery of promising indications of mineralization which will be referred to later. At a distance of a few miles to the west of the area in question, and opposite to the confluence of McDonald and Horsethief creeks, a massive intrusion of granite makes its appearance. It is generally considered that these batholithic intrusions of granite were coincident with an active period of mineralization and that the ore-deposits of the Kootenay district are genetically connected with them. Hence the marginal contact-zone between the sedimentaries and the granite-mass on Horsethief creek should be worthy of attention from the prospector.

The formation underlying the area of the claims consists of steeply tilted and uniformly bedded dolomitic limestones and quartzites. Traces of copper have been found on the lower portion of the hill, consisting of copper-stains along small cracks and cleavage-planes, evidently of secondary origin, indicating the presence of copper ore somewhere higher on the mountain-side.

Traces of lead in decomposed and iron-stained limestone are also found on the lower extremities of the hill, but not enough work has been done on this material to allow a definite opinion to be formed as to whether it is in place or has come from higher up. A sample taken from a shallow open-cut assayed: Silver, 2.1 oz. to the ton; lead, 2.4 per cent.

What appeared to be the most interesting showings on the claims are situated at an elevation of 6,150 feet, or approximately 2,500 feet above Horsethief creek. Here the formation is lying at a comparatively flat angle, and in a band of limestone forming the top of a ridge between two gulches there is exposed a large quantity of material, highly impregnated with iron oxide, in which a few specks of galena are often noticeable. Shallow diggings indicate that this material covers a considerable area; at the only open-cut of any consequence a little clean galena is exposed at a depth of 8 feet below the surface. A sample across a width of 18 inches at the bottom of the cut, which was taken to represent the highest-grade streak, assayed: Gold, 0.03 oz.; silver, 19.4 oz. to the ton; lead, 12.3 per cent.; zinc, 7.9 per cent.

The work done so far is only sufficient to demonstrate possibilities, which appear to fully justify systematic trenching as a preliminary step to determine the character of the deposit.

Phoenix Group.—This property is situated at the head of Farnham creek and is owned by W. Heap Holland and R. Gallup. A contract for 100 feet of tunnelling has been let.

McDONALD CREEK.

Silver King.

This property, consisting of one mineral claim, is situated on McDonald creek at a distance of at least 28 miles by road from Lake Windermere Station on the Kootenay Central Railway. The elevation of the tunnel above sea-level is 7,100 feet by aneroid. The only cabin available is situated by the roadside at a distance of about 500 feet from the workings and belongs to the Ptarmigan Mines Company.

The formation consists of limestone and slates, having a north-westerly strike and dipping to the west at a steep angle. Along a well-defined slip between a highly siliceous limestone hanging-wall and a softer formation on the foot-wall side a small vein was disclosed which conforms with the strike and dip of the enclosing rocks.

Exploration at the surface by means of a short tunnel and open-cuts uncovered several small bunches of ore, from which a shipment of about 12 tons is said to have been made some twelve years ago, since which time the property has been inactive. To explore the vein at greater depth a tunnel was driven at an additional depth of about 50 feet below the short upper tunnel.

This lower tunnel follows the slip fracture for 250 feet. The hanging-wall is firm and massive; the foot-wall has a laminated or schistose structure. At 46 feet from the portal the first ore is encountered, consisting of a thin streak of finely crystalline zinc-blende and galena which at 191 feet from the portal swells to form a small lens having a length of 13 feet and a maximum width of 8 inches. A sample across this 8 inches gave the following returns: Gold, 0.02 oz.; silver, 43.7 oz. to the ton; lead, 27.3 per cent.; zinc, 26.2 per cent.

There is probably 20 or 30 tons of this ore between the tunnel and the surface. Taking silver at 70.5 cents an ounce and lead at 8.6 cents a pound, the net value of this ore at the smelter would be about $65.38. After deducting mining, transportation, and treatment charges there is a possible profit of $12 a ton.

The surface workings are caved and filled with debris, so there is nothing much to be seen. Lying around on the dumps there are a few tons of ore which had been sacked, but the sacks have mostly rotted away and in all there is not more than 3 tons. A sample taken from a few sacks of this material assayed: Gold, 0.01 oz.; silver, 29.4 oz. to the ton; lead, 20.2 per cent.; zinc, 41.3 per cent.

The values in the vein are confined to the thin streak of finely crystalline zinc-blende and galena; the wall-rock on either side of this streak shows no evidence of replacement or mineralization. For further reference *see* Annual Report of Minister of Mines for 1915.

A company called the Silver Premier Mining Company, of Vancouver, was incorporated for the purpose of acquiring and operating this mineral claim. The somewhat extraordinary statements contained in the prospectus resulted in inquiries and the further examination of this property.

TOBY CREEK.

Mineral King.—This property, which has been described in previous reports, remained inactive during the season, presumably due to lack of capital. However, it received attention from visiting engineers and it is possible that next season may witness further development.

The Toby Creek road was repaired as far as Jumbo creek by the Department of Mines and the old bridges replaced by the Public Works Department. This road gives access to a well-mineralized area and should be an incentive to prospectors and owners of claims to endeavour to get some ore out and further develop their properties.

Silver Spray Group.*

This property, consisting of the *Silver Spray*, *Lady Bing*, *Betsy*, *I.O.U.*, and *Gracie Fraction* claims and owned by Murdock McLeod, is situated on the western side of Coppercrown creek, an estimated distance of 4 miles by trail from the Toby Creek wagon-road. The trail leaves the road at a point about 21 miles from Wilmer. The rocks of the area, which include limestones, quartzites, shales, slates, and schists, have a south-westerly strike roughly parallel to the trend of the valley of Copper creek, which appears to have been formed through erosion along the axis of an anticline, as the rocks on both sides of the creek dip into the mountain in opposite directions.

At an elevation of about 6,875 feet there is a camp-ground near a small creek falling steeply into Coppercrown creek. From the camp-ground the workings, consisting of two short tunnels and some open-cuts, extend up the gentle slope of the mountain-side (about 30°) for a distance of a few hundred feet. These workings develop a vertical line of fissuring or fracturing in limestone, striking north-westerly up the hill and apparently nearly at right angles to the strike of the strata. The ore is galena and lead carbonates, with associated small amounts of copper carbonates, in a calcareous gangue containing some quartz and barytes. The ore occurs in the fissure as well as following the bedding of the limestone as replacement ore.

At the same elevation as the camp-ground the lowest working, a short tunnel, was caved at the portal and could not be examined. Just above this tunnel there is a nice showing in an open-cut of oxidized silver-lead ore consisting of a width of 2½ feet of galena and lead carbonates.

A short distance farther uphill a tunnel has been driven 20 feet in on the fissure and in the face there is several feet of oxidized ledge-matter containing sparsely disseminated galena. On the southern side of the fissure, or left-hand side of the tunnel, and throughout the full length of the tunnel, there is from 12 to 18 inches of strong mineralization of replacement type following the bedding of the limestone. This ore, consisting of small masses and narrow bands of clean galena and oxidized ore, is apparently only partially exposed, being low down on the wall of the tunnel.

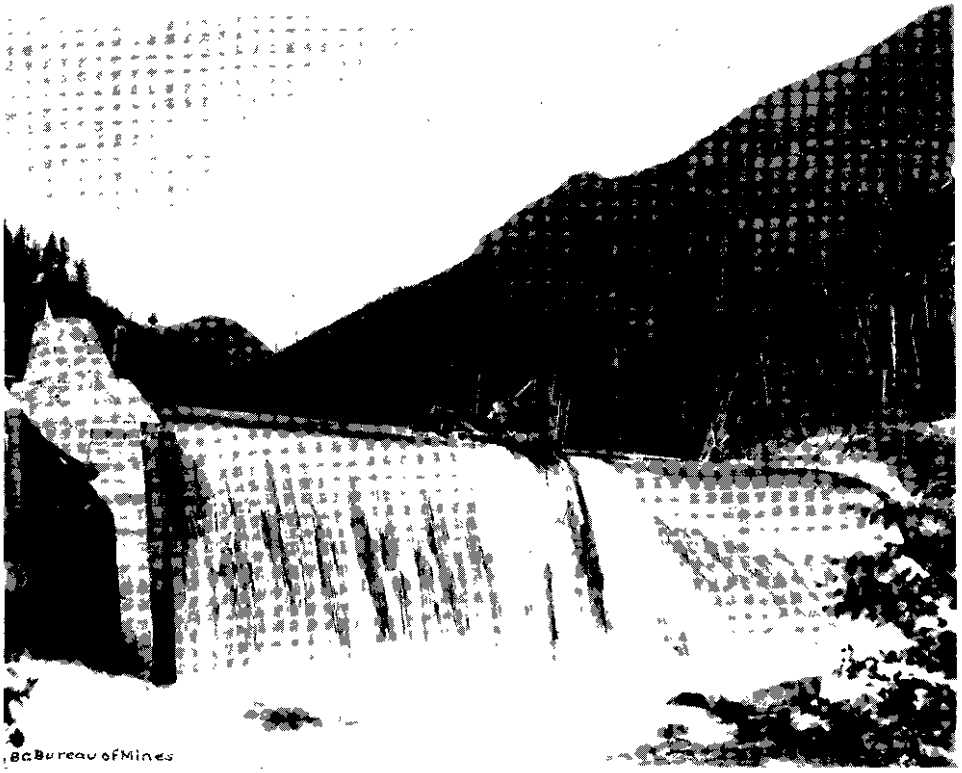
The fissuring is strong throughout the limestone, which appears to contact with shale some 200 or 300 feet above the upper tunnel. The ore in the fissure seems to be irregular and the ore following the bedding shows the most strength and continuity.

Last Hope and Last Chance.*

These old claims, situated on Delphine creek at an elevation of about 9,500 feet and some 30 miles (estimated) by road and trail from Lake Windermere Station, were recently acquired by W. Astor Drayton, of New York. The claims, on which very little work had been done and which had been dormant for many years, were formerly known as the *Beulah* and *Homestake*. They were allowed to run out by the former owners and were restaked in August, 1919. At the time W. A. Drayton took over the property the owners were J. F. White, H. Gamble, A. C. Smith, G. R. Leask, R. McNabb, and the R. E. Beattie Estate.



Kicking Horse Mine, Golden M.D.



East Kootenay Power Co., Bull River Dam.

A trip was made to the property in July following an application for Government assistance towards improving transportation facilities. A good truck-road extends up Toby creek from Invermere to Jackpine, and from there the sections of road used to the Forks and up the North fork of Toby creek, which have been repaired at intervals when warranted by mining activity, are good sleigh-roads which were used extensively during the winter months when the *Hot Punch* property at the head of the North fork was being worked some years ago.

The *Beulah* and *Homestake* claims were formerly reached by an extension of the *Delphine-Tilbury* trail, which, though rough and steep at the upper end, could still have been used for preliminary work if some repairs had been made. The management, however, before doing any work on the showings, decided to build an entirely new trail some 5 miles in length from where the North Fork road crosses Delphine creek to a point at the foot of the bluffs (elevation 7,300 feet) some 2,200 feet vertically below the showings. It was proposed to install an aerial tram to connect the two points and for this purpose some 6,000 feet of ⅝-inch cable was being taken up to the property. At the upper end of the trail, newly completed, a crew of eight men were excavating in the side-hill preliminary to setting up tents. There was no trail beyond the camp and to get to the workings it was necessary to make a difficult and arduous climb up the bluffy ground and steep talus-slopes, covered with snow in places.

Although the writer was expected at the property that day, there was unfortunately no one available to guide him to the showings, and J. F. White, the foreman, was "up the hill." Consequently, after receiving directions which proved incorrect, an attempt was made to find the "mine," and several hours were spent climbing the precipitous ground until an elevation of about 9,500 feet was reached. As it was then getting late and the workings could not be found without a guide, and as no work had been done on the property since J. D. Galloway reported on it in 1915, the attempt was abandoned.

Galloway's description of the property, the *Beulah*, published on page 95 of the Annual Report for 1915, is as follows: "This claim is situated some distance above the *Tilbury* and *B.C.*, at an elevation of about 9,500 feet. There may have been a trail up to it at one time, but this is now practically obliterated, and to get up to it is a somewhat difficult climb. There are two claims in the group—the *Beulah* and *Homestake*, owned by Al Palmer, G. A. Stark, Larabee, and Charles Fitzsimmons. Practically no work has been done on the property, although it has been staked for a number of years. It nearly constitutes an assessment to climb up to the property.

"The vein has a strike of N. 50° W. and dips at 75° to the north-east. It is from 1 to 3 feet wide, consisting of quartz, liberally mineralized with galena and grey copper. Near the top of a steep hogsback running down from the peak of the mountain there is an open-cut on the vein with a 50-foot face and the commencement of a tunnel. A sample of selected ore containing a lot of grey copper which was taken assayed: Gold, 0.1 oz.; silver, 471.2 oz.; lead, 13.8 per cent.; copper, 15.8 per cent. In conversation with one of the owners later on the writer was told that there was another open-cut farther up the ridge in which the vein shows up well. This property is badly handicapped by its inaccessibility."

It is reported that the tramway was not finished, but that an attempt was made to pack down some ore, and that heavy snow came on and the ore had to be abandoned. No ore was brought to the railway for shipment.

FRANCES CREEK.

Steele Group.—During the season a crosscut tunnel was started to cut the vein at an additional depth of 100 feet and a small crew of men was employed for a few months. According to latest advice, work has been suspended pending the organization of a new company.

Lead Queen. This property was acquired by New York interests and a crew of men were put to work in the fall of the year under the direction of E. W. Watson. Raising on the vein from the lowest level was immediately started and according to latest advice the results have been encouraging. It is understood improvements have been made, including a new camp at a short distance from the workings. A telephone-line has also been installed to Brisco. In the spring (1926) the erection of a tramway is contemplated, the preliminary survey for which has been made.

PLACER-MINING, FINDLAY CREEK.*

R. A. Ballentine and associates, of Portland, have taken up thirty-two bench and creek leases on the upper reaches of Findlay creek with a view to testing out their placer-gold possibilities. The ground is situated about 16 miles back from Canal Flats, 10 miles by old logging-road and 6 miles by trail.

This summer some preliminary testing of the gravels was done, the results of which are said to have been encouraging, and some drilling may be undertaken next year. Other work done in connection with this undertaking includes extensive repairs to the old trail and the building of a large and substantial cabin.

Several parties of prospectors were active in the upper Findlay Creek area looking for silver-lead-zinc deposits in the northern extension of the Aldridge formation.

FORT STEELE MINING DIVISION.

The production of the *Sullivan* mine has been maintained during the year at the rate of 3,000 tons a day. The better grade of ore mined has been reflected in an increased metallic output of the reduction-works at Trail. Additions are being made to the concentrator which will increase its capacity by 1,000 tons a day. The average number of men employed at the mine is 750 and at the concentrator 240, both figures including men on construction-work.

The 500-ton concentrator being erected by the Consolidated Mining and Smelting Company at Moyie to treat the tailings from the old *St. Eugene* concentrator is nearing completion. Apart from the major operations of the Consolidated Mining and Smelting Company, there has been a decided revival of mining activities throughout the Division. On account of the phenomenal success of the *Sullivan* mine a great deal of interest has naturally been centred around Kimberley, where the ground has been gone over carefully by engineers in the hopes of finding indications which would warrant exploration with the diamond-drill, or by other methods, to locate possible extensions of the ore-zone. The first company in the field to carry on exploration and development work was the Porcupine Goldfields and Finance Company, of London, which acquired the *North Star* and *Stemwinder* properties.

Stemwinder. This property is situated on Mark creek, about half a mile to the west of the portal of the *Sullivan* tunnel. The property, originally owned by the McKenzie & Mann interests, was bonded in 1923 by O. C. Thompson, who last year interested the Porcupine Goldfields and Finance Company. The area in which the workings are located is underlain by the quartzites of the Aldridge formation, which have been somewhat contorted, possibly by the intrusion of a large mass of diorite which outcrops a short distance to the east of the workings. A considerable amount of tunnelling had been done on the property many years ago in an attempt to define the ore-zone, while in more recent years diamond-drilling was undertaken by the Federal Mining and Smelting Company.

Present operations have been principally confined to the development of the mineralized zone at greater depth from the shaft, which work has been guided to a certain extent by diamond-drilling. Drifting from the shaft on the 125-foot level has disclosed a body of zinc ore some 260 feet long having a width of from 15 to 20 feet. The average values are reported to be 20 per cent. zinc, 1 per cent. lead, and 1 oz. in silver to the ton. The strike of this ore is approximately north and south, while its dip, as indicated by drilling, is to the west. The dip of the formation was not definitely determined by the writer, but it probably conforms to that of the ore.

Sinking of the shaft to the 250-foot level was in progress at the time of examination and one diamond-drill was being operated. The mineralization of iron sulphides in the form of pyrrhotite is extensive, and generally the conditions appeared to warrant exhaustive measures being taken to thoroughly exploit the area, which is understood to be the intention of the company.

The mine plant is up-to-date and sufficient for present requirements, consisting of a 720-foot Ingersoll-Rand compressor, a 10 by 12 hoist, a Leyner drill-sharpener, and pump. Power is supplied by the East Kootenay Power Company. Forty-five men were employed. At the *North Star* group the company has two drills in operation and is now having the area tested by the Swedish electrical prospecting methods.

In this connection O. C. Thompson states that electrical prospecting is proving to be a very satisfactory method of determining ore-bodies. The findings have invariably been found to be correct by subsequent diamond-drilling. As this is a new departure in this district, the following

notes prepared by Hans Lundberg, one of the principals of the Swedish Electrical Prospecting Company, are submitted through the courtesy of O. C. Thompson, of the Porcupine Goldfields, Development, and Finance Company:—

"*Electrical Prospecting.*

"The great difference in electrical properties, especially in conductivity, between ore-minerals and rock-minerals are fundamental to all methods of electrical prospecting. Ore-minerals with a metallic lustre, such as chalcopyrite, pyrite, pyrrhotite, arsenopyrite, specular iron, magnetite, etc., also graphite and a number of coals, have a considerably higher conductivity than the surrounding rock and soil.

"Ore-bodies of good electrical conductivity will cause disturbances in any electrical or electromagnetic field. These disturbances are located and the position and character of the ore-bodies are thus determined. The magnitude of disturbances depends on the conductivity (i.e., the proportion of conductive minerals), size, and proximity to the surface of the ore-body.

"The sequence of procedure, as carried out in practice, is as follows: Preliminary tests, reconnaissance, detailed and qualitative investigation.

"By preliminary tests it is determined whether the characteristics of the ore and the geological conditions are such as to warrant an electrical investigation and which of the methods will be the most successful. By the reconnaissance survey the approximate position of the conductors is located. The boundaries and outlines are determined by detailed survey. Efforts to obtain an idea as to the physical character of the ore-body are then made by qualitative survey.

"It is distinguished between two principal groups of methods, the potential and the electromagnetic.

"By the *potential* methods an electrical alternating current is caused to flow in the ground and the path of the current is surveyed by means of tracing equipotential lines.

"If an ore-body of good conductivity exists under the surface of the ground it will, so to speak, attract the current because it has less resistance than the surrounding rock and soil. At the same time the equipotential lines, which run at right angles to the current, are altered so that the ore-body seems to thrust the lines apart.

"The current is supplied to the ground by means of electrodes extended along the surface of the ground as two parallel lines and grounded at suitable points.

"In tracing equipotential lines a movable circuit is used, which consists of two electrodes connected with each other through a telephone receiver. Lines of equal potential are obtained by means of a movable circuit by locating points on the ground between which no sound is heard in the telephone receiver. The equipotential lines, being staked out on the ground and surveyed by means of transit and stadia rod, are then transferred to a map, from which a clear idea will be obtained as to the distribution of the current in the ground.

"By the *electromagnetic* methods an electromagnetic field is established and anomalies caused in this field by conducting ore-bodies are examined. According to the manner of supplying the current these methods are divided in two groups.

"By *one group* alternating current is caused to flow in the ground between electrodes in the same way as by the potential methods, and the course of the current is investigated by determining the direction and intensity of the electromagnetic field surrounding the current.

"Above an ore-body situated between the electrodes the intensity of the electromagnetic field has its maximum and the direction of the field is at right angles to the strike of the ore-body.

"By the *other group* of methods no grounding connections are used; a closed loop of insulated cable is laid out on the ground and supplied with alternating current. The current in the loop is surrounded by an electromagnetic field of force, which on neutral ground may be mathematically calculated.

"An ore-body will alter the direction as well as the intensity of this field, due to eddy currents induced in the ore-body. The eddy currents are surrounded by electromagnetic secondary fields of force, which combine with the primary field to form resulting fields. By examination of the course of these resulting fields it is possible to locate and outline an ore-body beneath the surface of the ground.

"Electromagnetic fields are investigated by means of movable coils, either directly using one coil and audion volt-meter or by comparing the intensities at two different points, when two coils are used connected with each through a telephone receiver.

"The methods operated together complete each other in a very successful way, as they are partly based on quite different characters of ore-minerals. So far the best results are the discovery of a large sulphide-ore district in Northern Sweden, but there is good reason to believe that the methods will be of great use in British Columbia, for geological conditions in many districts are similar."

During the year R. A. Grimes staked an area of fifty-two claims adjoining the eastern boundary of the Consolidated Mining and Smelting Company's group of claims and sold his interests to R. M. Bennett and associates, of Minneapolis. Diamond-drilling was started with one drill on September 8th. This hole is located at a distance of about 2 miles to the east of the *Sullivan* tunnel and by the end of the year it was reported to be down 1,000 feet. Some trouble was experienced with broken ground, necessitating the cementing of the hole. H. M. Roberts is directing the work, assisted by J. G. Bennett.

Kootenay King.

This property is situated on Wildhorse creek at a distance of approximately 6 miles by road and 6 miles by trail from Fort Steele. The property, comprising a group of six claims, has had a considerable amount of development done on it, representing many years of labour, by the owner, William Myers, of Fort Steele. During 1925 the property was acquired by W. B. Dornberg, W. A. Ainstie, and associates, who had a small crew of men employed on surface exploration during the summer months. The small cabin, which has accommodation for several men, is situated at an elevation of 6,850 feet and within about half a mile of the workings.

The formation, consisting of steeply tilted quartzites, has a strike of N. 7° W., although in the vicinity of the ore occurrence its uniformity appeared to be interrupted by shearing and folding movements. Aplitic dyke intrusions were noticed in places, apparently following the bedding-planes.

On the steep hillside at an elevation of 7,550 feet an open-cut exposes mineralization across a width of 15 feet, consisting of a finely crystalline mixture of lead, zinc, and iron sulphides and occurring in a sheared zone having a northerly and southerly strike. A sample taken across a width of 7 feet gave the following returns: Gold, 0.02 oz.; silver, 6.6 oz. to the ton; lead, 19.1 per cent.; zinc, 21.9 per cent.

To explore this outcrop at depth three tunnels have been driven. No. 1 is a crosscut and has been driven for 87 feet at a depth of 35 feet below the outcrop. This tunnel cuts the sheared zone, but the ore is confined to a narrower width than on the surface. A sample taken across a width of 40 inches assayed: Gold, 0.01 oz.; silver, 5.1 oz. to the ton; lead, 14.8 per cent.; zinc, 18.1 per cent. No. 2 tunnel is also a crosscut and is driven into the hill for 375 feet at a vertical distance of 109 feet below the outcrop. At about 178 feet the sheared zone was cut, showing mineralization in stringers and small bunches, but no ore in commercial quantity. Drifting for 84 feet in a northerly direction has shown little improvement, if any, in mineralization. No. 3 tunnel has been driven from a point 226 feet below the open-cut for 311 feet in a northerly direction and apparently parallel to the sheared zone; no ore has been developed in these workings as yet.

Recent surface diggings indicate the possible extension of the ore to the south of the cut, but at the north end faulting has apparently cut off all traces of the ore-zone.

Copper King.

This group consists of the *Copper King* and *Copper Queen* claims and is owned by W. S. Santo, of Cranbrook. The property is situated on Bull river at a distance by road of 7 miles from the town of Bull River. Formerly it was known as the *Chicamon Stone* and was reported on by the Provincial Mineralogist in 1898. Trial shipments were made by the present owner during the winter of 1924. This ore was mostly mined from near the surface, the principal values being in copper, silver, and gold.

The formation of the hillside consists of thinly bedded quartzites striking in a northerly direction and dipping to the west. The vein, which closely follows a diabase dyke and dips 70° to the north, striking east and west, can be traced for a considerable distance by a number of shallow diggings, including several small shafts. At a point where some of the best values were obtained a winze had been sunk and a little stoping done at the surface. This winze connects with the upper or No. 1 level, which has been driven along the vein for about 270 feet. Below this level the winze is reported to have been sunk for a distance of 76 feet, but is now full of water.

No stoping has been attempted on the vein above the tunnel, although it shows strongly in the roof, averaging about 2 feet in width; at a point near the westerly end of the drift a shaft has been sunk, presumably on ore, but could not be examined as there were no ladders. From the nature of the workings, both underground and at the surface, it is assumed that the values occurred in "chimneys."

A sample taken across 18 inches at 36 feet west of the winze from the surface gave the following returns: Gold, 0.01 oz.; silver, 0.6 oz. to the ton; copper, 0.39 per cent. A sample taken across 18 inches 30 feet farther to the west gave: Gold, 0.03 oz.; silver, 1 oz. to the ton; copper, 0.22 per cent.

In order to explore this vein at greater depth a crosscut tunnel was being driven at a vertical depth of 140 feet below the No. 1 level. The objective of this tunnel was to tap the vein at a point below the winze, making its total length, according to a Brunton survey, 360 feet, of which 155 feet had been driven. In this tunnel several quartz stringers had been cut, carrying values in silver, lead, and zinc. A sample of some of the best of this ore assayed: Gold, trace; silver, 1.4 oz. to the ton; lead, 10.9 per cent.; zinc, 13.5 per cent.

Trilby Group. This property consists of nine claims staked on the westerly slope of Mount Fenwick and adjoining Bull river. The formation consists of quartzites and argillites which have been intruded by the same character of dyke-rock as that on the *Copper King*. At an elevation of about 1,000 feet above the river a tunnel has been driven to explore an outcrop of galena which shows in a pocket near the portal. In the 65 feet of tunnelling at this point very little ore is visible and the ground is faulted and broken, indicating a slip near the surface. The ore occurs in the green dyke-rock and consists of galena associated with zinc-blende and pyrite in a quartz gangue. A sample from a few tons on the dump assayed: Gold, 0.02 oz.; silver, 13.8 oz. to the ton; lead, 43.4 per cent.; zinc, 3.4 per cent. At about 1,500 feet farther up the hill there were reported to be some good showings, but snow prevented an examination.

Dardenelles Group. *This property is situated on Wildhorse creek at a distance of 10 miles from* Fort Steele. A trail about 2 miles in length leads to the property from the end of the wagon-road. A good cabin at the bottom of the trail is occupied by E. Banks, one of the pioneer miners of Wildhorse creek. Work was first done on the property in the nineties, when an arrastra was built near the creek for the treatment of the ore. This is an excellent example of the splendid and thorough work done by the old-timers. Unfortunately it did not give satisfactory results, probably due to the fact that the best gold values were associated with galena and pyrite.

There is a good cabin at the mine-workings, which are situated at an elevation of 5,900 feet or 2,400 feet above the creek. The formation consists of schists and quartzites having a strike of N. 10° W. and dip of about 60° to the west.

A quartz vein having a north-easterly strike and dipping into the hill at an angle of about 20° has been traced by shallow diggings for a considerable distance from the main workings, showing in places a strong width of quartz, but better values are said to exist where the walls are narrow.

To prospect this vein an incline shaft had been sunk for a distance of 55 feet, in which it shows a width of 4 feet of quartz carrying a streak of galena 3 or 4 inches wide. This galena forms the centre of the vein for 15 or 20 feet down, apparently representing a different period of mineralization. The following samples were taken:—Across the vein at a point 5 feet from the bottom of the shaft: Gold, 0.06 oz.; silver, 0.9 oz. to the ton. Across a width of 4 feet at 26 feet from top of shaft: Gold, 0.8 oz.; silver, 0.5 oz. to the ton. Across a 4-inch streak of galena within 10 feet of top of shaft: Gold, 0.61 oz.; silver, 5.4 oz. to the ton; lead, 52.9 per cent. The above sampling would indicate that the highest values are associated with the galena, and where this does not occur the better values are confined to enriched streaks near the walls of the vein.

A little lower down the hill another incline has been sunk on a parallel quartz vein for a distance of 217 feet. The vein is cut off by a fault near the bottom of the shaft, giving the impression that the face of the hill had slid downwards and that this vein represents a faulted section of the vein already referred to. A sample taken across 12 inches of quartz, which represented the width of vein at about 100 feet down the shaft, assayed: Gold, 0.24 oz.; silver, 0.6 oz. to the ton.

Homestake Group. This property consists of the *Golden Fleece, Golden Bug, Golden Chest, Golden Pine, Golden Pine No. 2,* and *Golden Hope* claims and is situated on Perry creek at an approximate distance from Cranbrook of 22 miles by road, from which point the camp is reached by several miles of trail. It was recently acquired by A. C. Bowness, W. S. Santo, and associates, of Cranbrook, who have let a contract to explore the vein at depth, and a crew of eight to ten men were put to work by W. J. Scorgie.

The area is underlain by rocks of the Creston formation, consisting of argillaceous quartzites and argillites, but as the surface was covered by snow at the time of examination little information was obtainable regarding the structural features of the hillside. Work of a prospecting nature has been carried on at the property over a period of years, the greatest development being done in the nineties, but these old workings were in a caved condition and said to be inaccessible.

At an elevation of 5,850 feet a series of open-cuts expose a sheared zone, the hanging-wall of which is a massive argillaceous quartzite; on the foot-wall side there is a crushed schistose material carrying broken quartz stringers, there being no well-defined foot-wall exposed in the workings examined. Lying in this sheared zone and adjacent to the hanging-wall a small quartz vein was exposed in an open-cut near an old 60-foot shaft. A sample taken across a width of 13 inches at this point assayed: Gold, 0.24 oz.; silver, 0.5 oz. to the ton. The shaft was sunk on this vein and at the bottom there is said to be a good showing of ore, but these workings could not be examined on account of the unsafe condition of the old ladders.

The vein, following the sheared zone, strikes N. 25° E., and its northerly extension has been picked up by a deep open-cut some 75 feet from the shaft. Here some healthy-looking quartz is exposed lying next the hanging-wall, a sample of which assayed: Gold, 0.24 oz.; silver, 0.5 oz. to the ton.

The southerly extension of the vein from the shaft has been prospected by open-cuts and several short tunnels, now caved. Broken quartz stringers in schist are exposed in these workings, streaks of which might be expected to carry values; the sampling, however, was disappointing. For instance, a sample taken across 30 inches of what was considered to be the most likely material exposed in the open-cuts gave the following results: Gold, trace; silver, 0.5 oz. to the ton. This sample was carefully taken and, as it was considered important, the assaying was checked.

The new work being done consisted of a tunnel driven (at an elevation of 5,650 feet) from the southerly end of the sheared zone, and along it, in order to prospect the vein and further develop the ground under the old shaft. Its direction was N. 25° E. and at the time of examination was in 56 feet; the ground encountered in this distance was soft and required timbering. A sample taken of the schist and broken quartz fragments from this tunnel assayed: Gold, 0.01 oz.; silver, 0.04 oz. to the ton.

Dominion Group.* This old property, situated on the northern side of St. Mary river, about 4 miles westerly from St. Mary lake, was visited in July following the receipt of an application for Government assistance towards improving transportation facilities. No activity has materialized since, however. The workings, which are at elevations from 3,450 to 3,550 feet, or a few hundred feet above the valley, are reached by a trail 1 mile in length from Meacham's cabin.

These workings, consisting of two short tunnels, some open-cuts and trenches, develop siliceous lenses striking north-easterly up the mountain and conforming to the strike of the enclosing quartzites. The ore, consisting of lead, copper, and iron sulphides sparsely disseminated through the siliceous gangue, occurs irregularly in pockets or short lenses.

The lower tunnel, 67 feet in length, was driven on the "vein," but there is nothing much in evidence in it except a little barren ledge-matter left in the side of the tunnel near the portal. A little farther up the hillside and about 50 feet vertically above this tunnel another short tunnel has been driven in on a 5-foot width of siliceous ledge-matter containing disseminated sulphides, a sample across which assayed: Silver, 1.17 oz. to the ton; lead, 4 per cent.; copper, 0.16 per cent. This ore fades away in a short distance and in the face there is no sign of mineralization or "vein." Continuing up the hill, and some 30 feet vertically above the upper tunnel, an open-cut shows a width of 4 feet of sparsely mineralized quartz.

Among the many minor activities the following may be mentioned: At the *Brenda* group near Skookumchuck the Globe Mining Company had a small crew of men working under the direction of Dan McIntosh. The Blake Bros., of Skookumchuck, are reported to have been

working their claims. Bird Bros., of Cranbrook, have been engaged in driving a tunnel on a gold-quartz vein which outcrops near the Perry Creek road at a short distance from the falls. In the St. Mary Lake section the Evans Bros. continued work at the *Achilles* group on Fiddler creek and James Angus on his property on Hellroaring creek. Near Jaffray W. Linberg and associates were working at a silver-lead prospect. Many properties were examined by visiting engineers and more activity in this direction may be expected next season.

PLACER-MINING.

At Wildhorse creek hydraulicking was continued by the Wild Horse Gold Mining Syndicate under the management of W. A. Drayton, of New York. It is understood that plans have been prepared for turning the monitors on to other portions of the syndicate's holdings. The result of the season's work is not known at the time of writing.

GYPSUM.

The gypsum-deposit near Wardner, referred to in last year's report, was acquired by the Manitoba Gypsum Company, but as far as is known no attempt was made at developing it during the year.

LIST OF SHIPPING-MINES IN THE WINDERMERE AND FORT STEELE MINING DIVISIONS, SHOWING TONNAGES SHIPPED, 1925.

Mine.	Locality.	Tons shipped.	Character of Ore.
Silver King	McDonald creek	21	Silver, lead.
Paradise	Toby creek	1,174	Silver, lead.
White Cat	Slade creek	81	Silver, lead.
Comet	Sand creek	5	Copper, silver.
Sullivan	Mark creek	1,117,610	Silver, lead, zinc.
Total		1,118,891	

AINSWORTH MINING DIVISION.

Among the many activities of this District, the resumption of operations at the *Bluebell* and the encouraging results obtained by recent developments at the *Whitewater* might be considered of outstanding importance.

There has been no let-up of prospecting and minor activities and the area has attracted many visiting engineers, which in all probability will result in an increase in development and exploratory work during the coming season.

AINSWORTH CAMP.

It is understood that the Florence Silver Mining Company was reorganized and a new company—namely, the Florence Consolidated Mining Company—was incorporated for the purpose of acquiring the holdings of the old company. No work is reported to have been done on the property by this company during the season.

The following activities have been reported: The *Highland* mine was worked by the Consolidated Mining and Smelting Company; ore shipments were made to Trail for concentration; sixteen men were employed. The *Albion*, *Silver Hoard*, *No. One*, *Spokane-Trinket*, and *Tariff* were worked in a small way by lessees and shipments of silver-lead ore made to Trail.

United. This property consists of the *United*, *Leona*, *Jeanne Fr.*, *Bert*, *Coolidge Fr.*, *Harding Fr.*, *Airdale Fr.*, *Wally Fr.*, and *Joe Dandy Fr.* claims. It was worked some years ago and more recently has been lying idle, but has now been acquired by the United Mines, Limited, of Spokane. I. O. Proctor is the engineer in charge of the work. It is situated at a distance of 4 miles by road from Ainsworth at an elevation of 3,350 feet.

The geology as described by S. J. Schofield in Memoir No. 117 of the Geological Survey is as follows: "The rocks in the immediate vicinity of the deposit consists of green hornblende-schists which strike about north and south and dip 45° to the west. The upper contact of the schist with the overlying andalusite-schist is located at the base of a steep cliff about 150 feet

west of the shaft. The lower contact of the schist with the underlying banded quartzites lies about 700 feet east of the shaft. A dyke of camptonite 4 to 5 feet wide, conforming in strike and dip with the enclosing schists, passes just east of the shaft."

The vein, striking easterly and westerly, cuts the formation at right angles, or nearly so, and dips at an angle of 60° to the south. It has been exploited at the surface by trenching and can be traced for approximately 100 feet. As the outcrop occurs on a flat bench, shaft-sinking was necessary to explore the vein at depth and an incline sunk a good many years ago is reported to be down 170 feet.

This shaft, equipped with a small steam-hoist, has two compartments, a 4- by 4-foot skipway and a 4- by 5-foot manway. Drifting has been done at three levels in the shaft. On No. 1 level at a depth of 50 feet on the dip the vein has been drifted on over a length of 65 feet west of the shaft, when its continuity was interrupted by a fault, beyond which 150 feet of tunnelling has failed to disclose any ore. On the east side of the shaft drifting discloses the vein for a length of 90 feet, with 12 inches of ore in the face. Ore is found close to either wall of the dyke which crosses the vein in section of the workings. On this level the vein has been stoped for a length of 100 feet to a height of 25 or 30 feet. The best showing in the stope was at the westerly end, where the ore showed a width of about 3 feet and consisted of galena and zinc-blende having a banded structure.

On No. 2 level the work consists of 60 feet of drifting to the east of the shaft. On the No. 3 level 116 feet of drifting has been done to the west of the shaft and 70 feet to the east. These two levels were under water and could not be examined. The above information was supplied by the engineer in charge.

A sample taken across an 18-inch width of clean galena exposed in a pocket in the bottom of a shallow trench about 50 feet west of the shaft assayed as follows: Silver, 22.9 oz. to the ton; lead, 67.1 per cent.; zinc, 5.7 per cent., which indicates that the silver ratio may be expected to be about ⅓ oz. to the unit of lead. A small crew of men was employed and it is understood that work will be continued through the winter.

RIONDEL.

Bluebell.

This well-known property, which has been lying idle since 1921, was acquired by S. S. Fowler and B. L. Eastman in 1924, when steps were taken to unwater the mine and remodel the concentrator. This work was completed during the early part of the summer, since when steady shipments have been made to Trail. The mine has a good record of production, extending over a long period of years, and as frequent reference has been made to it in the Annual Reports only a few brief notes will be submitted.

The outcrop of the ore-body, from which a large tonnage has been extracted from grass-roots, is by far the most striking and largest surface exposure as yet seen in the district, all the more imposing on account of the intense action of oxidation, which has had the effect of converting a large ore-body into various shades of yellow dirt containing appreciable values in lead in the form of "carbonates" and in occasional nodules. In places sulphide ore still exists near the surface. Near the top of the west wall of the "glory-hole" this class of ore was being mined. Here the mineral-bearing solutions had evidently been impounded by a narrow aplitic dyke, so that, although within several feet of the surface, no outcrop was visible.

There are three distinct ore-bodies, each of which has been formed along cross-fractures in a bed of marbleized limestone. The intersection of fractures, it is thought, has been responsible for the localizing of the ore-shoots. The limestone, having a strike of north and south, lies between impervious beds of mica-hornblende schist. The dip of the formation is 35° to the west. A few acidic dykes originating from the near-by granite cut the formation and probably bear some genetic relation to the deposit.

Below the "glory-hole" the workings extend to a depth of about 850 feet on the dip of the formation. The main level of the mine is an adit-tunnel, above which the ore has been stoped to the surface, leaving large open caverns. An incline shaft gives access to the lower workings, which consist of four levels spaced at intervals of 100 feet.

The ore occurring as replacement deposits is irregular in shape, but is apparently persistent along the zones of fracturing. The sulphide ore, as exposed in a number of places, consisted of galena and zinc-blende associated with pyrrhotite. The lowest level could not be examined on account of water in the shaft, due to repair-work being done on pumping equipment, but from

what could be seen in the other workings it was evident that the prospects for steady production were good, while the possibilities offered by further development appeared promising.

The plant equipment covers the requirements for the mining and milling of 200 tons a day. The power used is mostly generated by water, supplemented by an auxiliary steam plant. During normal conditions the water-power developed is about 480 horse-power. The pumping equipment, consisting of two Allis-Chalmers centrifugal pumps driven by electric motors, satisfactorily handles the flow of water in the mine, which is estimated at 300 gallons a minute.

The principal improvements to the concentrator include the addition of a flotation unit of eighteen cells and the necessary grinding equipment. The ore is first treated in fourteen Hartz jigs, where the bulk of the lead is recovered. The middlings are fed to a Hardinge pebble-mill, classified, and then go to the flotation-machines. The zinc concentrates are said to carry up to 45 per cent. zinc and the lead concentrates about 60 per cent. lead. The mill-feed at this time was reported to carry the following values: Lead, 6 per cent.; zinc, 8½ per cent.; and about ⅓ oz. of silver to the unit of lead.

Owing to the exceptionally dry season the shortage of water-power during the latter part of the year hampered operations and finally caused a temporary suspension of mining at the end of December. Some 17,500 tons of ore was mined during the period between July 1st and the end of the year; of this, 117 tons of crude oxidized lead ore and 4,800 tons of milling-ore was shipped direct to Trail; the remainder went through the *Bluebell* concentrator, of which about 2,065 tons of jig middlings also went to Trail for further treatment owing to lack of power. The average number of men employed was forty-six.

Kirby Group.

Development-work was steadily proceeded with during 1925 under the management of A. J. Curle, of Kaslo, a small crew of men being employed. The property is owned by the Shepherd Mining Company and is referred to in previous Annual Reports. The long crosscut tunnel driven from the lake-shore, after penetrating about 700 feet of gravel-wash, encountered a dolomite and schist formation and at 975 feet intersected a vein lying close to an aplite dyke. The width of the vein at the point of intersection is between 3 and 4 feet; its apparent strike is S. 35° E., with a dip to the west. A drift was started from the main crosscut in a southerly direction and after cutting the vein, apparently, at an oblique angle, swings and follows a north-and-south fault-fracture, conforming with the bedding-planes for a considerable distance, in which a little ore had been found in places. Near the point of intersection the vein-filling consisted of quartz carrying a little galena, zinc-blende, and iron sulphides, possibly constituting ore of a milling grade. Whether the above strike is the true strike of the vein or whether it follows the north-and-south fracture was indefinite; in any event a little more work at this point seemed advisable and was recommended.

Exploratory work being done by the company consisted of open-cuts and trenches on the *Kirby No. 14* claim, where along cross-fractures in a bed of limestone encouraging mineral indications had been found. This mineralization bears no relation to the area being explored by the long tunnel above mentioned.

A new bunk-house and cook-house were erected during the year, which provide excellent accommodation for a crew of about twelve men.

KASLO.

Cork-Province.

This property is situated on the Keen creek and is owned by the Cork-Province Mines, Limited, of Kaslo. Mining operations were started in June under the management of W. E. Zwicky, who had a small crew of men employed. When visited in July stoping was in progress from the 400-foot level. The stope, which was being extended in a westerly direction from the shaft, had reached a height of about 50 feet above the level and had a width of from 6 to 8 feet. The ore, which is irregular in occurrence and of milling grade, consisted of a mixture of galena, zinc-blende, pyrite, and spathic iron. At the westerly face of the stope it showed a width of about 18 inches.

The continuation of the No. 4 level in a westerly direction from the shaft appeared to offer good possibilities for the further development of new ore reserves, but at this time, owing to the lack of capital, exploration and development were necessarily limited and the operation of the mine was largely dependent on the tonnage produced. However, according to a recent letter from the secretary, a certain amount of development was accomplished with satisfactory results, more ore having been encountered in the No. 3 and No. 4 levels.

The mill was run continuously, one shift a day, until October 13th, when the lack of water forced a close-down. Since that time ore is reported to have been shipped to Trail for concentration at the rate of 50 tons a day.

Silver Bell.—This property, which has from time to time produced high-grade silver ore, was operated in a small way and a shipment made to Trail.

Gibson.—It is reported that the Daybreak Mining Company, which owns and operates the property, has installed a compressor plant.

Liberty Hill.—Small-scale operations were undertaken during the season and a shipment made to Trail.

Whitewater. This mine is situated on the Kaslo–Nakusp branch of the Canadian Pacific Railway and is owned by the Whitewater Mines, Limited, of Kaslo. Major-General J. W. Stewart, of Vancouver, is president and W. H. Burgess, of Kaslo, managing director and secretary.

The mine has had a good record of production over a long period of years and ranks among the leading silver-lead-zinc properties of the district. It is opened by fourteen levels, all of which are adit-tunnels, except Nos. 11, 12, and 13. The No. 14 level is now the main adit and consists of a crosscut 2,225 feet in length, from the end of which an incline raise connects with the upper workings. The known productive zone of the old *Whitewater* mine has been mined to the tenth level; below this, formerly known as the *Whitewater Deep* mine, little exploratory and development had been accomplished at the time of the amalgamation of the two properties; so there remains in this lower portion of the mine a large vein area with decided potentialities and in which the work so far done has met with encouraging results, while other areas favourable for exploration still exist in the upper portion of the ore-zone.

During 1925 reconditioning and development occupied the time of a small crew of men. The surface improvements included the establishment of a new camp near the railway, consisting of a bunk-house to accommodate twenty-four men and a boarding-house to accommodate fifty men. The flume for power purposes was rebuilt and sundry improvements made to the plant, etc.

The underground work was largely confined to the lower workings—namely, the eleventh and twelfth levels. On the thirteenth level there is a nice showing of zinc ore, no doubt representing a considerable tonnage, but so far only partially developed. On the twelfth level development during the early part of the year disclosed from 3½ to 5 feet of good milling-ore in a cross-fracture. Referring to this, a recent letter from the manager states: "As so far drifted on, with ore still in both faces in No. 12 level, there is continuous ore for 500 feet, with width of from 2 to 20 feet." The No. 11 level is being extended to tap the downward continuation of the "productive zone" of the old *Whitewater* below its easterly extension on the No. 10 level. The main raise from the No. 14 level to the No. 12 is being widened and will have four compartments—namely, a skipway, manway, ore-chute, and muck-chute. This work will be completed early in 1926, when it is intended to ship 30 tons a day to Trail.

A small tonnage of sorted ore extracted in the course of development was shipped by the company, while leasers working in the upper portion of the mine shipped 263 tons of silver-lead-zinc ore and 150.5 tons of silver-zinc ore. The high-grade ore and conditions generally around the fringes of the old stopes are particularly favourable for leasing operations, which have been steadily carried on for a number of years with beneficial results both to the lessees and the owners. The mine is well equipped with power and the facilities generally are favourable for low mining costs. Complete information is obtainable in the well-prepared prospectus of the company.

The Metals Recovery Company, under the management of M. S. Davys, of Kaslo, erected a small concentrator on Kaslo creek to treat the tailings from the old *Whitewater* mill. These tailings, which carry values in silver and zinc, have been distributed along either side of the present channel, forming a flat bank of considerable area. In order to handle this material mine-tracks had been laid, on which a Ford engine mounted on a truck provided the tractive power for hauling the mine-cars into which the tailings were shovelled.

A small hoist hauled the cars up an incline to the top of the mill-bin. The equipment of the concentrator essentially consisted of a large Allis-Chalmers pebble-mill, Callow flotation-cells, and two tables. The plant was complete and should give satisfactory results.

Water-power provided by Lyle creek was ample for all requirements during normal conditions, but probably insufficient during the dry season. Forest fires which raged in this section during the month of July destroyed the camp buildings, but fortunately the concentrator was saved.

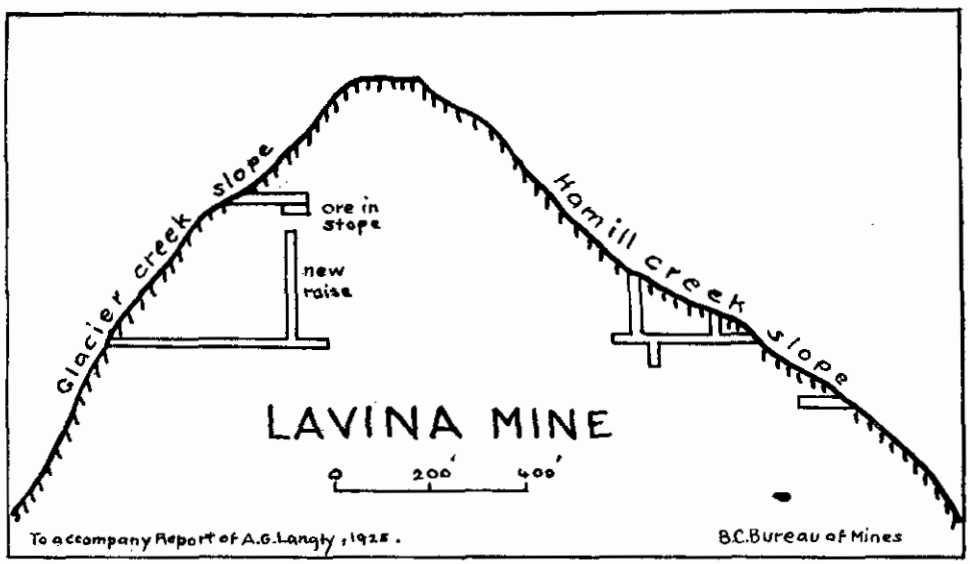
Utica. This property was acquired last year by the Canadian Mines Merger, Limited. Recent information received from official sources is to the effect that the work accomplished during the year has been purely of a development nature on the lowest level. Exploratory crosscuts and drifts were driven to locate the downward extension of the veins, but financial difficulties arose which prevented the completion of this work.

Forest fires up Robb creek destroyed the *Lincoln* camp buildings and blocked the main trail, which was shortly after reopened by the Department. Lyle Creek area also suffered from fires, the *Eureka* camp being destroyed and several other cabins.

Leviathan. This property is situated on Campbell creek, across the lake from Kaslo. The property was taken under option by the Victoria Syndicate and some development-work done, but as results did not come up to expectations it was abandoned.

HOWSER LAKE.

Lavina.* This property, consisting of the *Lavina*, *Bute*, *Iron Cap*, *St. Joseph*, and *Ruthie Bell* Crown-granted claims, is situated on both sides of the summit of the ridge between Hamill and Glacier creeks, tributaries of the Duncan river north of Kootenay lake, at an elevation of 7,000 feet (cabin). Formerly the claims were reached from Hamill creek by a trail from the end of the wagon-road, but as the upper part of this road has been washed out, the present route, more roundabout, is by a trail leaving the Argenta–Howser road at White's ranch.



A considerable amount of development-work was done between 1899 and 1904, during which period some 200 tons of ore was shipped, reported to have assayed from 50 to 60 per cent. lead and 60 to 70 oz. in silver to the ton. The mine was closed down from 1905 until 1918, when a car-load of ore was shipped by lessees. The property was again closed down until 1924, when Ed. Nordman and associates took it over under lease and bond from the Bank of Montreal. Since 1924 development-work has been proceeded with continuously, except for short periods in the winter months when difficulty was experienced in getting in supplies.

The old workings, consisting of tunnels and open-cuts, are on both sides of the summit and extend down for several hundred feet below it. The formation is composed of phyllites, bands of limestone, and a few bands of diabase-schist. In the centre of the mineralized area there is

a banded siliceous rock, probably altered limestone. The strike of the formation is north-westerly across the ridge, with dips from 30° to 50° to the north-east.

In the above rocks there is a network of small veins, some parallel to and others crossing the formation. The ore, which is chiefly clean galena and carbonates, shows a predilection for the limestone, occurring usually either in a limestone-band or near one. The gangue in some of the veins is white milky quartz; in others, calcite.

The veins vary from a few inches to 4 feet in width. The galena, which may be coarse cubical or fine wavy, occurs scattered through the gangue in masses up to 14 inches in diameter. The ore-bodies are small and irregular as to size.

The work done by the present operators, from three to four men, includes a 176-foot raise put up from the No. 2 (*Iron Cap*) tunnel on the Glacier Creek slope to tap a nice showing of ore in an underhand stope commenced from the No. 1 tunnel-level. They have also opened up several small showings of clean galena and carbonates on the surface near the summit and on the Hamill Creek slope. The following samples were taken from these new showings:—

Description.	Gold.	Silver.	Lead.
	Oz.	Oz.	Per Cent.
Ore sorted for shipment	0.04	32.7	77.1
Across 4 inches of galena in siliceous ledge-matter in open-cut on Hamill Creek slope	0.03	17.8	56.4
Across 8 inches of galena and carbonates in farthest west open-cut on summit	0.04	20.4	44.5
Across 8 inches of carbonate ore (excluding nuggets of galena) in open-cut on summit	0.02	14.6	45.9

When the property was visited towards the end of August from 10 to 15 tons of sorted ore had been extracted. It is understood that shipments will not be made until sufficient tonnage has been accumulated to warrant necessary improvements to the trail.

President.* This property, consisting of the *President*, *Two Brothers*, *Howser*, and *President Fraction* Crown-granted claims, was originally staked by R. S. Gallup in 1893, subsequently sold, and reacquired by him in 1924. The property is situated on Gallup creek, on the western side of Howser lake, about 6½ miles from Howser. Work done by the owner during the last two seasons includes the building of two new cabins and construction of a trail to the workings, which are at elevations of from about 2,000 to 2,100 feet above the lake-level. These workings, situated on both sides of the creek where it flows steeply through a rocky gulch, consist of three tunnels aggregating about 700 feet in length.

The rocks of the area include limestones, schists, and chloritic schist, having a north-westerly strike and nearly vertical dip. Just below the workings there is a bold and massive outcropping of trachyte which probably accounts for the highly altered, crushed, and decomposed condition of the limestone country-rock, in which occur stringers and lenses of galena and oxidized ore carrying high silver values. A sample of sorted ore assayed: Gold, 0.02 oz.; silver, 107.2 oz. to the ton; lead, 51 per cent.; zinc, trace.

As yet nothing definite in the way of an ore-body has been found in the underground workings, but evidences of mineralization are widespread and the results of further development will be awaited with interest. The above notes are from a necessarily hurried trip to the property and some surface showings farther up the mountain were not seen.

Third Trip.* This claim, owned by Jack Rady, of Howser, is situated on the west side of Howser lake, about 1 mile southerly from the *President* group. The claim, which was staked recently following the discovery of some copper-carbonate float, was not visited owing to lack of time. A sample submitted to the writer by the owner assayed: Gold, 0.03 oz.; silver, 0.9 oz. to the ton; copper, 17.44 per cent.

Among others who have been active in the area tributary to Howser lake may be mentioned Hugh McKay, of Kaslo, who was working his *Red Elephant* gold property on Hall creek; John Noihl, of Howser, who has been busy at the *International* group on the upper Duncan river; the *Surprise* group on Glacier creek was examined on behalf of Spokane interests, but at the time of writing it is not known if a deal has resulted. On Hamill creek Jean Brochier

has put in a busy season at his property, the *St. Patrick* group, the work done by him including some 60 feet of tunnelling. The ore carries values in silver, lead, and zinc.

CRAWFORD BAY.

Silver Hill.* W. J. Williams and associates, of Nelson, recently leased this property from the Bank of Montreal and have been actively engaged in making preparations to mine ore that was left in the old workings. Except for occasional leasing operations, the mine has been idle since 1901. It is reached by a trail 3 miles in length from the end of the old road, 9½ miles from the Crawford Bay wharf.

The property is described in the Annual Report for 1917. The ore, chiefly galena with some associated grey copper, contains values in silver, lead, and zinc. The work done by the lessees includes reopening the old trails, the construction of a substantial bridge across Crawford creek, and repairs to the mine buildings.

FRY CREEK.*

On Fry creek D. M. Wadams and associates were busily engaged all summer in developing the *Rainbow*, which is situated in the angle between the two forks of Fry creek, about 6 miles back from Kootenay lake. The ore contains gold values. The new work includes some tunnelling and a new cabin has been built.

CASCADE CREEK.

Comstock.* This property, consisting of the *Comstock*, *Noonday*, and *Garrity* claims, and owned by P. J. Sheran, of Nelson, was being developed this summer with a small crew by the Juno Syndicate, composed of business men of Nelson. The claims are situated on the steep mountain-slope on the south-eastern side of Cascade creek at elevations ranging from 6,000 to 7,500 feet. The trail leaves the railway at a point 2 miles below Poplar and follows an easy grade up the creek for a distance of about 6 miles to the lower cabin; then climbs steeply to the mine cabin situated on the timbered hillside at an elevation of about 6,000 feet.

In the vicinity of the workings the formation consists of schists and argillites with intercalated aplite dykes. A few hundred feet above the mine cabin some open-cuts have been made along the outcrop of a quartz vein mineralized with bunches and disseminations of galena and small amounts of zinc-blende. The vein, the width of which was only partially exposed, apparently conforms to the stratification of the enclosing rocks, which have a general north-westerly strike and dip into the hill at about 40°. A sample from a small pile of ore from the surface assayed: Gold, trace; silver, 12 oz. to the ton; lead, 22.6 per cent.; zinc, 2 per cent.

About 60 feet vertically below the open-cuts a tunnel 90 feet long cuts a few feet of mineralized quartz near the face. A sample of sorted ore from this tunnel assayed: Gold, 0.03 oz.; silver, 23.4 oz. to the ton; lead, 37.6 per cent.; zinc, *nil*. At a vertical distance of 97 feet below the upper tunnel a crosscut was being driven to intersect the vein. This tunnel was then in about 258 feet and the vein was expected to be cut in a short distance if its dip was maintained.

The above workings are all on the *Noonday* claim, which is the lowest. The *Comstock* claim is situated on the summit of the ridge above the *Noonday* and *Garrity* claims. Just over the summit an open-cut has been made exposing a quartz vein the width of which, said to be 4 feet, could not be ascertained as it was partially covered with loose rock and drifted snow. A little digging disclosed a portion of the vein 12 inches wide well mineralized with galena, a sample of which assayed: Gold, 0.02 oz.; silver, 17.4 oz. to the ton; lead, 20.6 per cent.; zinc, 2 per cent. The strike of this vein is apparently easterly and westerly across the ridge.

Juno Group.* This property consists of the *Reco*, *July*, *July 28th*, and *Juno* claims, also owned by P. J. Sheran, and included in the property to be developed by the Juno Syndicate. This group is situated about 2 miles in a westerly direction from the *Comstock* property and the claims extend up to near the head of Cascade creek.

The formation, ore, and character of mineralization are much the same as on the *Comstock* group. Scattered over the claims there are numerous showings of quartz of varying widths mineralized with bunches and disseminations of galena, with which pyrite is generally associated and in some places zinc-blende.

The development chiefly consists of open-cuts, most of which have caved so that the width of the mineralization could not in most cases be measured. On the *Reco*, at an elevation of about

5,700 feet, two showings of quartz of undetermined width were examined, the mineralization consisting of disseminated galena and pyrite. Selected ore from the dumps of these showings assayed: Gold, 0.32 oz.; silver, 18.6 oz. to the ton; lead, 32.2 per cent.; zinc, *nil*.

On the *July 28th* there is an old tunnel driven 40 feet in on a well-defined quartz vein from 12 to 26 inches in width mineralized with galena, zinc-blende, pyrite, and oxidation products. The strike of this vein is about east and west (mag.) and its dip about 45° to the north. Some 30 feet from the portal of this tunnel an open-cut has been made exposing a width of 26 inches of ore, which assayed: Gold, 0.04 oz.; silver, 17.6 oz. to the ton; lead, 29.1 per cent.; zinc, 29.8 per cent. Near the face of the tunnel an old winze, said to be 30 feet down, was full of water. About a quarter of a mile back along the trail from this tunnel and at a slightly higher elevation an open-cut exposes a quartz vein 2 to 3 feet wide mineralized with disseminated galena. Continuing farther back along the trail and on the *July* claim there is a big trench and some open-cuts showing quartz on the dumps more or less mineralized with disseminated galena and pyrite of the usual character.

On the *Juno* claim the workings are at an elevation of about 4,700 feet. An open-cut exposes a 12-inch quartz vein, standing nearly vertical and striking N. 55° E. into the hill, in which the mineralization is disseminated galena and pyrite. Near the vein the soft and crushed argillites contain scattered seams of galena associated with stringers of quartz. Farther down the hill and 100 feet vertically below the open-cut there is an old tunnel driven about 20 feet in these argillites. Preparations were being made for building a cabin near this working with a view to continuing the tunnel to intersect the vein showing in the open-cut above.

Occurrences of Diatomaceous Earth near Goldhill.*

Deposits of diatomaceous earth were examined in the vicinity of Goldhill and southerly along the flats and bench lands on the eastern side of the Lardeau river. Indications of the material can be found scattered over an area about 1 mile long by from ¼ to ½ mile in width. Scarcely any work has been done to try and find a deposit of commercial proportions. A few pits were sunk on the bench behind the hotel, but at this point the earth was only a few inches thick under 3 feet of overburden and appears to be very limited in extent.

At other points in the area thicknesses of from 2 to 6 feet of earth have been found with from 2 to 3 feet of overburden. No attempt has been made to trace the extent of these beds, but judging from the topography, consisting of depressions where the greatest widths of earth are found, the possibilities of finding workable deposits are very favourable. The occurrences are all very conveniently situated to the railway and less than a quarter of a mile from it.

The material is exceedingly fine-grained, quite coherent, grey-white to cream-coloured, and of exceptionally light weight. The earth occurs in a very compact form and separates cleanly from the enclosing clay and soil. The following analysis was made to test the material for use as a household cleanser and polishing-powder:—

	Per Cent.
Silica	71.51
Iron and alumina	17.28
Lime	2.75
Magnesia	0.74
Sulphur trioxide loss on ignition	4.20
Undetermined (mostly alkali)	3.52

A screen analysis of the same material gave:—

Retained on 100-mesh sieve	0.15
Retained on 200-mesh sieve	11.00
Passes through 200-mesh sieve	88.85

These results, according to experts in the trade, show that the material is quite satisfactory as a household cleanser and if screened through a 200-mesh screen can be used as a polishing-powder. The material can also be used for many other purposes, some of which are mentioned in the following extract from Memoir 118 (page 76), published by the Geological Survey, Canada, in 1920:—

"Diatomaceous earth is the name given to deposits that are usually white or cream-coloured, and consist wholly or in part of the siliceous tests of low forms of plant-life known as diatoms. These tests or shells are very minute, the largest smaller than a pin-head, the average visible only under a high-power microscope. They are composed wholly of hydrous silica and contain a great

many small pores arranged in intricate patterns. The chemical composition, minute size, hardness, and porosity of the tests have made the earths composed of them useful in a number of ways. The coherent earth, reduced in a manner which will not destroy the tests themselves and separated into powders of varying fineness, is used largely as an abrasive and polishing agent in metal-polishes, soaps, metal-powders, match-heads, etc. The purer products are used in the manufacture of siliceous glazes and water-glass or silicate of soda. The large amount of pore-space within the tests prevents the passage of heat through the loosely packed earth or through blocks and bricks made of it. This property, combined with the ability to stand great heat without fusion, makes the earth of great use as insulating linings for furnaces, ovens, safes, as well as in the walls of cold-storage receptacles. It has also been used as an absorbent for corrosive liquids, liquid manures, nitro-glycerine, and for many other purposes."

LIST OF SHIPPING-MINES IN THE AINSWORTH MINING DIVISION, SHOWING TONNAGES SHIPPED, 1925.

Mine.	Locality.	Tons shipped.	Character of Ore.
Albion	Ainsworth	83	Lead, silver.
Blue Bell	Riondel	17,531	Lead, zinc, silver.
Cork-Province	Keen creek	2,960	Silver, lead, zinc.
Highland	Ainsworth	3,817	Lead, zinc, silver.
Liberty	Zwicky	2	Silver, lead.
Silver Bell	Keen creek	27	Silver, lead.
Silver Hoard	Ainsworth	62	Silver, lead.
Spokane-Trinket	Ainsworth	30	Lead, silver.
Tariff	Ainsworth	41	Lead, silver.
Whitewater	Whitewater creek	414	Lead, zinc, silver, gold.
Whitewater tailings	Whitewater creek	480	Zinc, silver, lead.
Total		25,447	

SLOCAN MINING DIVISION.

Steady progress has been made during 1925 in mining, development, and exploration work. The *Silversmith* mine, which ranks next to the *Sullivan* in production of silver, lead, and zinc in the district, had an exceptionally good year. The development at the *Ruth-Hope* is of outstanding importance and promises well to establish another substantial and steady producer. It is also very gratifying to see the name of the *Lucky Jim* mine on the shipping-list again with a substantial tonnage to its credit for the year and to hear encouraging reports of recent development.

In considering the Slocan, the value of its production over a long period of years, the stability of metal prices at a high level, favourable marketing conditions, and the success met with in recent developments are all factors which demand the attention of engineers.

The advent of strong British mining companies under competent local management has helped to give an impetus to mining and will in all probability result in a considerable amount of new work being undertaken.

SANDON.

Silversmith. This mine, owned by the Silversmith Mines, Limited, and located at Sandon, is the next largest shipper of silver-lead-zinc ores to the *Sullivan*. John B. White, of Spokane, is president; R. C. Lammers, of Spokane, secretary; and Oscar V. White, manager. Since its inception the affairs of the company have been well managed, with results that have fully justified the large initial expenses necessary, in the way of development, plant, and equipment, to place the mine on a producing basis. From the time when normal production was attained in June, 1922, the mine has been a steady producer, regular dividends have been paid, and a large cash reserve accumulated.

The balance-sheet for the fiscal year ended May 31st, 1925, shows a net profit for the year of $141,854.39. Subsequent to this, two quarterly dividends amounting to $25,000 each and one of $50,000 have been paid, making the total amount disbursed since incorporation in 1918 $575,000.

The output of the mine for the fiscal year ended May 31st was as follows: 92 tons of crude silver-lead ore and 34,441 tons of mill-feed, producing 3,072 tons of silver-lead concentrates, and 3,760 tons of silver-zinc concentrates. The mill was idle three shifts due to lack of power and forty-six shifts due to repairs.

When visited in the fall, ore was being stoped in the westerly end of the workings from the *Silversmith* ore-shoot, at about 40 feet below the tenth level, where an excellent grade of ore was exposed, consisting of a large percentage of massive galena. On the eleventh level the drift on what is known as the hanging-wall streak had a width of about 7 feet of good milling-ore at the face, consisting of galena, zinc-blende, and spathic iron, having a banded structure. It is very satisfactory to learn that the silver values in the ore mined from the deepest horizons of the workings are much higher than in the ore heretofore mined; while it is particularly interesting also to learn that it carries appreciable gold values, which is unusual in the ores of the Slocan. Some car-loads of silver-lead concentrates shipped during the latter part of the summer gave net smelter returns of between $7,000 and $8,000; the ore running about as follows: Silver, 119 oz. to the ton; lead, 63 per cent.; zinc, 3.5 per cent.

Recent developments from the bottom of a 200-foot winze from the tenth level, on the downward continuation of the famous *Slocan Star* ore-shoot, have met with encouraging results. Here it is reported that ore of a milling grade has been encountered, having a width of from 5 to 6 feet and length of 65 feet. The development campaign of the company includes the sinking of a winze on the *Silversmith* ore-shoot from the eleventh level and further sinking on the *Slocan Star* ore-shoot.

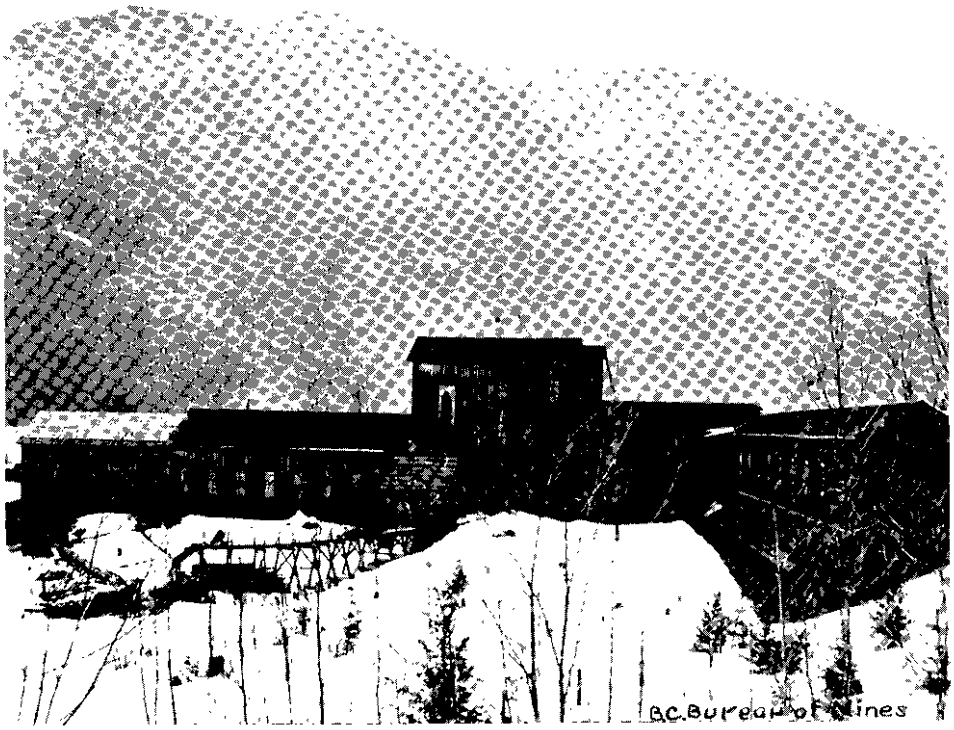
Ruth-Hope. The 2,700-foot crosscut tunnel driven from the *Ruth* No. 5 level by the Ruth-Hope Mining Company, under the direction of R. H. Stewart, was completed in September, thus accomplishing the primary object for which the company was formed. The time taken to make this drive through slates and quartzites was approximately eleven months. The total distance from the end of this tunnel to the portal of the No. 5 level is 3,700 feet. Its elevation is reported to be between 40 and 50 feet lower than the *Silversmith* No. 10 level, while it lies at a short distance in a lateral direction from the western boundary of the *Rabbit Paw* claim of the *Silversmith* group. The tunnel first cut what was thought to be the *Hope* vein, which, lying at a flat angle, carried a small streak of galena, but as yet no prospecting has been undertaken at this point to determine the character of this occurrence.

The western extension of the foot-wall ore-shoot of the *Silversmith* was next encountered, and as exposed in a 5-foot drift consisted of mixed and broken-up vein-matter, a large percentage of which was spathic iron. However, there appeared to be sufficient galena and zinc-blende disseminated through it to constitute a milling grade of ore. At 100 feet farther in the hanging-wall shoot of the *Silversmith* vein was cut, showing at the point of intersection a reported width of about 14 feet of milling-ore. This ore-shoot has been drifted on for 130 feet westerly from the crosscut, when a fault was encountered, past which the vein had not been picked up.

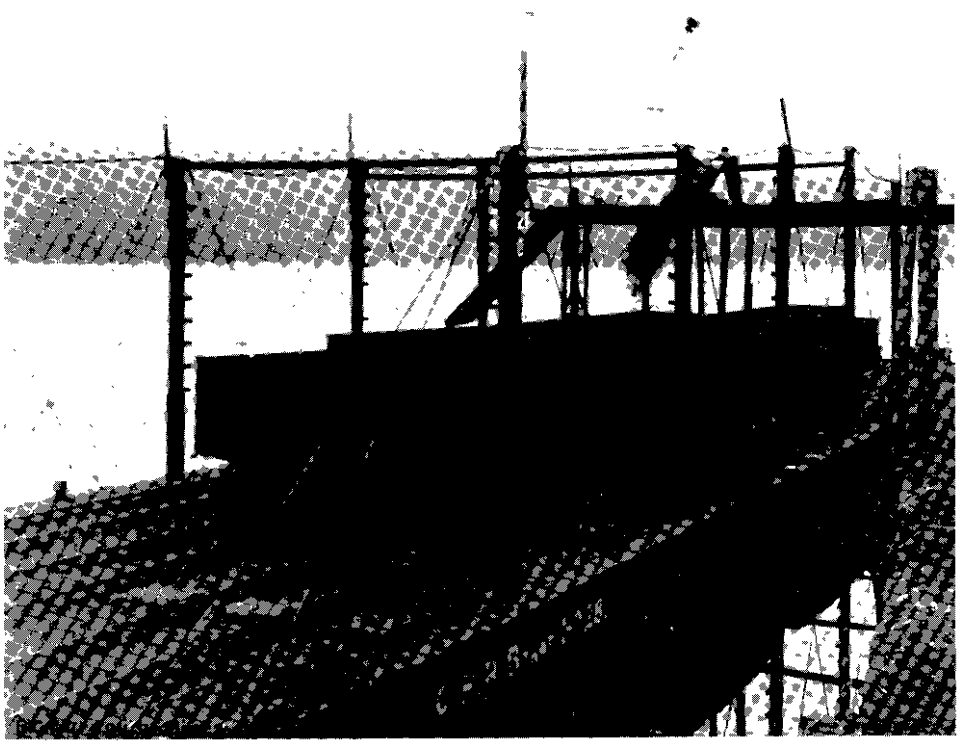
The best grade of ore in this drift, as far as could be ascertained, occurred irregularly in lenses of varying width up to about 5 feet, but as it did not appear to be confined to the width of the drift, more work, in the nature of crosscuts, was necessary to reveal the true width of this portion of the vein. From the point of intersection between the long crosscut and the hanging-wall ore-shoot there is a distance of about 260 feet along its strike to the easterly boundary of the property. No drifting had been done in this direction, in which, in all probability, lies the best portion of the ore-shoot on this level.

The crosscut has been extended for a short distance past the vein in the hanging-wall of porphyry, which also forms the hanging-wall of the *Silversmith* ore-bodies and is estimated to be about 600 feet thick. The tendency of the *Silversmith* ore-bodies to rake to the west gives promise of the ore-body on the *Ruth* ground increasing considerably in length as depth is gained. Stoping operations were started during the latter part of the year and shipments of mill-feed were made to Trail for concentration.

Good progress is reported to have been made in the upper workings of the *Ruth* on the No. 2 vein, with the production of a considerable tonnage of high-grade ore, while the development of this ore-zone has met with encouraging results. Surface improvements include the alteration of the tramway to handle ore from the fourth and fifth levels. This necessitated changing the headworks to No. 4 and installing a sorting-house and ore-bin at the No. 5 level. About thirty-five men are employed.



Rosebery Concentrator, Slocan M.D.



Bluebell Mine, Ainsworth M.D.—Loading Concentrates.

Carnation. This property, owned by A. R. Mann and worked during recent years by George Clark, comprises six claims and includes the *Minnehaha*, which was referred to in the 1924 Annual Report. It was acquired under option by R. H. Stewart on behalf of the Victoria Syndicate, of London. Work of an exploratory nature has been steadily carried on by a crew of seventeen men. Recently a portable compressor was installed.

Lucky Jim. This mine is situated on the Kaslo–Nakusp branch of the Canadian Pacific Railway and is owned and operated by the Lucky Jim Lead and Zinc Company, of Spokane. The engineer in charge of the work is A. G. Larson, of Spokane. The property comprises twelve claims and fractions, aggregating about 350 acres.

Its operation over a long period of years has been intermittent, due to the vicissitudes of the metal market, for the general run of the mine is a low-grade mixture of lead, zinc, and iron sulphides, although considerable quantities of high-grade zinc and lead ore have been mined, the former predominating. However, with the present stability of the prices of lead and zinc at a high level and favourable marketing conditions, success would seemingly depend on an adequate tonnage, efficient management, and the necessary capital to enable the operations to be carried on to the best possible advantage. As far as is known, the conditions in these respects are favourable.

The ore-deposits of the *Lucky Jim* are of an unusual type in the Slocan; although in a number of cases similar geological conditions may have been responsible for the localization of ore-shoots, they are not always recognizable owing to shearing movements in the zone of fissuring.

The formation, consisting of slates of the Slocan series with which bands of limestones have been interbedded, strikes easterly and westerly and dips at about 40° to the south; it has been cut by a series of mineralized fractures striking north-east and south-west. Where these fractures cut the slate they form narrow seams, but where they enter the limestone replacement has taken place and ore-bodies of considerable dimensions have been formed.

The past production of the mine has been derived from ore-bodies of this character, and as there is evidence of important fractured zones farther back in the mountain the exploration carried on since the property was acquired by the present company has largely consisted of extending the underground workings to intersect these zones.

When visited in July the No. 3 level had intersected the downward projection of one of these fractured zones and good ore had been encountered in the drift; the size of the ore-body had not been definitely determined, but conditions appeared promising for a deposit of substantial dimensions. This was in virgin ground and had not been developed by the other workings, the lowest of which gains a depth of 750 feet below the No. 3 level. The No. 5 level is used as the main adit and from it the ore is transported by a 2-bucket tram to the ore-bins at the railway. A large tonnage of ore has been stoped from this level, which can be easily realized by the proportions of the large untimbered openings. The ore shows up strongly in the bottom of the level, suggesting good possibilities for further exploration from the No. 6 level. This latter level is only about 30 feet above the railway and hence represents the lowest elevation from which the deposit can be approached by an adit-tunnel.

Conditions underground are exceptionally favourable for cheap mining, practically no timbering being necessary, while transportation facilities are all that could be desired. Unfortunately, however, the water-supply for power purposes is limited and only available for about six months in the year. It is understood that the installation of a Diesel oil-engine is contemplated in the near future.

The company acquired the *Rosebery* mill, formerly owned by the Rosebery-Surprise Mining Company and used by them to treat the *Surprise* ore. The equipment, not being designed for ores of the *Lucky Jim*, failed to give satisfactory results, so arrangements were made late in the year with the Consolidated Mining and Smelting Company to have the ore concentrated at Trail. According to latest advice received, this arrangement is proving very satisfactory and regular shipments are being made.

McAllister. This property is situated on the Kane creek at a distance of about 3½ miles from Three Forks. The property is owned and operated by the Slocan Silver Mines, Limited, of Alamo, of which W. H. North is manager. Since the Standard Silver Lead Mining Company acquired the controlling interest in 1922, over 4,000 feet of underground work has been accomplished.

This year a 2-bucket tram 4,000 feet in length was installed, connecting the lower tunnel with ore-bins beside the road. The road to Three Forks was widened and improved and after a development campaign extending over a period of about five years regular shipments to Trail were started in September.

The mine has six levels, all of which are opened by adit-tunnels, except the fourth and fifth. The depth gained on the vein is 600 feet on the projection of its dip, but so far it has only been developed down to the fourth level, where it shows an average width of 4.5 feet, with average reported values of 38 oz. in silver to the ton, over a length of approximately 380 feet. On the fifth level a small fairly high-grade hanging-wall streak was developed by drifting, but not the main vein. A raise on this streak comes up in the hanging-wall and had to be connected with the fourth level by a 50-foot crosscut. The sixth level consists of a long crosscut, which, although driven beyond the projection of the downward continuation of the vein, did not intersect it. However, the possibilities for picking up the vein below the fourth level are by no means exhausted, while the improvement in values with depth are decidedly encouraging.

The ore is quartz carrying silver values principally associated with grey copper (friebergite). A concentrator at the creek was first contemplated, but as favourable smelting rates were obtainable on siliceous ores of this character it was later decided to try shipping the crude ore to Trail. From the bottom of the tram the ore is hauled by motor-truck to the railway at Three Forks. During the latter part of 1925 over 900 tons was shipped. In the early part of the summer the compressor building and small boarding-house were destroyed by fire; fortunately the compressor and water-wheel were not damaged beyond repair.

Noble Five. This property, comprising the following claims: *Maude E.*, *World's Fair*, *Bonanza King*, *Knoxville*, *Noble Five*, *Deadman*, *Wild Goose*, and *Lucetta*, is owned by the estate of the late Hon. James Dunsmuir, of Victoria. The concentrator and office buildings are situated on the Cody Creek wagon-road at a distance of 1½ miles from Sandon. The lowest level of the mine-workings is situated at an elevation of 5,100 feet above sea-level or about 1,000 feet above the road.

Surface Plant and Equipment.—The concentrator, built and designed by the General Engineering Company, of Salt Lake City, has a rated capacity of 100 tons a day and, generally speaking, is in a good state of repair, only having been used for a short period. Its flow-sheet, embodying the latest milling practice, is designed to first make a lead concentrate with the minimum amount of grinding and then to regrind the middlings and tailings and treat them by oil-flotation.

For gravity concentration the equipment consists of two 3-compartment Hartz jigs and two Wilfley tables. For oil flotation and separation Callow pneumatic cells and six Wilfley tables are used. The flotation concentrates after passing through an American filter are fed to the bins for shipment.

Power.—Water-power derived from Cody creek by means of a long flume and 1,000 feet of 10-inch pipe-line drives the compressor. Water-power to drive the mill was derived from Carpenter creek. In this connection it may be mentioned that the flow of water from the mine, if continuous throughout the year, offers good possibilities for limited power development.

Tramway.—The aerial tram connecting the low level with the mill is about 3,000 feet in length. General repairs, including the replacement of some of the towers, are necessary.

Accommodation.—Excellent accommodation is provided at the mill and the mine for the men, the bunk-house at the mine having a capacity for sixty men.

Geology.—The formation underlying the hillside in which the *Noble Five* system of fissuring occurs is composed of slates, limestones, and quartzites of the Slocan series, which have been intruded by a number of light-coloured acidic dykes. These dykes, which are pre-mineral in age, have a north-westerly trend, roughly conforming to the strike and dip of the formation, while the veins cutting the formation have a north-easterly strike and dip to the south-east. The zone of fissuring has been prospected by a vast amount of underground work, extending from the lowest level of the *Noble Five* up the hill to the *Last Chance*, *American Boy*, and *Surprise*, which latter is situated around the summit of the ridge, so that one can travel underground through a vertical range of about 2,000 feet and come out on the other side of the summit.

Mine-workings.—The mine-workings of the *Noble Five* property are very extensive, a great deal of exploratory work having been undertaken. During the examination the writer was accompanied by W. Findlay, who, having worked as foreman for many years, had a thorough

knowledge of the workings. Unfortunately certain parts of the mine could not be examined on account of the heavy flow of water which had been diverted through the workings from the *Last Chance*. Attention was principally directed to those parts of the mine in which ore had been developed and which were expected to yield tonnage for the concentrator.

Low Level.—At an elevation of 5,100 feet a crosscut tunnel approximately 2,700 feet in length has been driven northerly into the hill, gaining a depth of 1,000 feet below the upper workings. In this length of tunnel the only vein encountered which carried any appreciable values was intersected at about 2,600 feet from the portal. This vein, having a north-easterly strike and a dip of 70° to the south-east, has been traced for a total length of about 300 feet, over the greater portion of which it was nothing more than a streak and too narrow to mine. It lies tightly frozen between massive walls of slate and for about 50 feet along its eastern extremity shows in the roof of the drift an average width of about 8 inches. Two raises on this vein have not met with encouraging results.

The following samples were taken:—No. 1, at eastern end of ore-shoot, across 4 inches: Gold, 0.02 oz.; silver, 71.7 oz. to the ton; lead, 52.5 per cent.; zinc, 6.2 per cent. No. 2, across 8 inches, 10 feet west from No. 1: Gold, 0.01 oz.: silver, 83.2 oz. to the ton; lead, 54 per cent.; zinc, 8.8 per cent. No. 3, across 12 inches, 10 feet west from No. 2: Gold, trace; silver, 43 oz. to the ton; lead, 28.7 per cent.; zinc, 33.1 per cent. No. 4, across 6 inches at 30 feet west from No. 3: Gold, 0.01 oz.; silver, 57.3 oz. to the ton; lead, 42.8 per cent.; zinc, 14.5 per cent.

The above sampling indicates average values of: Silver, 60.4 oz. to the ton; lead, 41.4 per cent.; zinc, 19.3 per cent. over a length of 50 feet and a width of 7.5 inches.

The vein is faulted at either end and a lot of futile drifting and crosscutting has been done in an endeavour to pick up its continuation. This level is connected with the eighth level of the old workings by a 4-compartment raise 1,000 feet in length and equipped with a cage operated by a small air-hoist. In this raise stations have been cut every 200 feet.

Old Upper Workings.—The eighth level, which is the lowest of the old workings, has been driven into the hill at an elevation of 6,100 feet. The upper terminus of the old tramway is situated near the portal. This tram is in a dilapidated condition. On this level the only portion of the vein which appeared worthy of consideration from an economic standpoint is confined to a length of about 200 feet, where the vein lying between well-defined walls has a banded filling of zinc-blende, spathic iron, quartz with pyrite, and an occasional pocket of galena. In this length the vein is not continuous, but has been subjected to faulting and squeezing.

It was from this section of the mine up to the sixth level that the bulk of the tonnage was expected for mill-feed, and preparations consisting of stoping to about 20 feet above the level had been commenced. Although the roof of the stope could not be closely examined or sampled on account of its height, the conclusion was arrived at that the average width of the vein did not exceed 2 feet.

At several places along the roof of the stope where the vein showed its characteristic filling samples were taken and the following results obtained:—Sample No. 5, across 36 inches at westerly end of stope: Gold, trace; silver, 2.9 oz. to the ton; lead, 1.2 per cent.; zinc, 26.5 per cent. Sample No. 6, across 24 inches at 65 feet easterly from sample No. 5: Gold, trace; silver, 5.6 oz. to the ton; lead, 4.1 per cent.; zinc, 17.2 per cent.

Drifting easterly from this stope, faulted ground was encountered past which the vein was picked up, but lying at an angle of about 45° and filled with crushed slate containing occasional bunches of ore.

Level No. 7.—This level, driven at an elevation of 109 feet above the No. 8, discloses the upward continuation of the ore-shoot on the No. 8, along a length of about 150 feet. This drift encountered pockets and good-grade ore, some of which can still be seen in places along the bottom of the drift, but very little is in evidence along the roof of the stope, some 20 feet above the drift. Here the vein shows similar characteristics, swelling to a maximum width of about 4 feet and pinching to a few inches.

A sample taken from a pocket of galena in the roof of the stope ran as follows: Silver, 89.3 oz. to the ton; lead, 61.9 per cent.; zinc, 8.3 per cent.; demonstrating as do other samples that the silver value is about 1½ oz. to the unit of lead and may be expected throughout the mine. The zinc ore does not carry high silver values.

Level No. 6.—On this level, which has been driven at 106 feet above the No. 7, there is little to be seen; the vein, evidently splitting above the No. 7 level, fades away into stringers on the

No. 6. The workings above the No. 6 were not examined on account of the heavy flow of water coming down the raise. It is understood, however, that the ore has mostly been stoped to the surface.

History.—According to office records the early history of the property dates back to the nineties. In about 1895–96 the first serious attempt at systematic development was undertaken by the Noble Five Mining and Milling Company, of Spokane, when the No. 8 level was extended into the hill and connected by a 6,100-foot aerial tram to a mill which was completed in 1896. In 1897 W. A. Carlyle, Provincial Mineralogist, reported as follows: "This mine was forced to suspend work on account of the lack of funds and indebtedness. The concentrator and Finlayson tramway, mentioned in Bulletin No. 3, were erected and exploratory work vigorously prosecuted, but, as since has transpired, the large expenditure for tramway and mill was premature, as not much pay-ore was found and the mine soon drifted behind, and with no capital to go farther had to face the inevitable and shut down."

Some twenty years ago the property was acquired by the late Hon. Jas. Dunsmuir. Development was proceeded with and small shipments made from time to time. The most recent work was confined principally to development of the low level and connecting same with the upper workings by a 1,000-foot 4-compartment raise. When the raise was completed in 1919 the construction of a new mill was started and completed in 1920. This mill was run for about three months, during which period 3,042 tons were milled. The average values contained in this feed were approximately as follows: Silver, 4 oz. to the ton; lead, 2.6 per cent.; zinc, 7.8 per cent. Soon after this the mine closed down and has remained closed up to the present time.

American Boy.—This property was operated by the American Boy Mining Company, of Spokane, with a small crew of men. John Vallance was in charge of the work.

Last Chance.—This property was acquired by the American Boy Mining Company and a small crew of men put to work late in the summer. Certain portions of the mine were also being worked by leasers.

Leadsmith. This property, formerly known as the *Noonday* and situated on Cody creek, was acquired by a new company called the Leadsmith Mines, Limited, in which some of the principal shareholders of the *Silversmith* are interested; John B. White being president and R. C. Lammers secretary.

A contract was let for the driving of a 600-foot crosscut tunnel to tap the vein at an additional depth of 600 feet. The property has not been examined, but it is reported on good authority to have possibilities for a large tonnage of milling-ore.

Corinth. This property, which originally belonged to A. J. Murphy, was acquired by the Corinth Silver-Lead Company, of Seattle, and a small crew put to work under E. J. Edwards, who, it is understood, was interested in the promotion of the company. The old workings are situated at a distance of about three-quarters of a mile from the end of the *Queen Bess* wagon-road.

Victoria Group. It is reported that the Sandon Silver-Lead Mining Company has recently been incorporated in Spokane for the purpose of operating this property, which is situated at a short distance from the town of Sandon, on the north side of the railway. It formerly belonged to John Worgan, who succeeded in digging out a little ore.

Gem. Situated on Carpenter creek at a short distance above Cody. The property has the distinction of being the only property in the district which has been worked for a number of years as a lead-placer deposit. High-grade silver-lead ore in the form of small boulders and nodules was found to occur in the creek-gravels, no doubt having been brought down from some vein in the hillside by the action of a slide. For the last two years M. Byrne, the owner, has been prospecting several known veins above the creek in an endeavour to locate its place of origin.

Victor Group.—This property was worked in a small way by George Petty and a car-load of high-grade silver-lead ore shipped to Trail.

Wonderful.—This property, owned by Clarence Cunningham, was further developed from the lower level, but so far results are reported to have been disappointing.

Exploration-work is reported to have been done on the *Cinderella* by E. L. King and on the *Hinckley* by the Standard Silver-Lead Company.

Queen Bess.—This property is owned by Clarence Cunningham. Prospecting is reported to have met with satisfactory results and the outlook for next season is encouraging.

Chicago. This group is owned by F. P. O'Neill and comprises the following claims: *Chicago No. 2, Chicago Fraction*, and *Pullman Fraction*. It is situated on Cody creek. Mr. O'Neill is one of the early pioneers of the camp, having located the *Ruth* in 1892. After many years of absence in California he returned to the Slocan in the early part of the summer and started working on this property, having a "hunch" that he would strike it rich. At the time of examination a tunnel had been driven 35 feet to explore the possible continuation of good-looking ledge-matter exposed by surface prospecting. This tunnel showed crushed slate and some slightly mineralized ledge-matter was making its appearance at the face. Soon after the tunnel had been started it was discovered that it was immediately on top of an old tunnel the portal of which had been completely hidden by caving. A new cabin had been built at a short distance from the workings.

Among the many minor operations, the following are some of the properties which were being worked under lease: *Surprise*, by Bruce Kirk, C. Towgood, and V. Clelant; *Monitor*, by George Gormley; *Queen Bess*, by Jack Jones, also Neil McMillan and Frank Delpretto; *Antoine*—Jack Semming had a lease on the dump and D. McGillivray is reported to have had charge of reopening the mine-workings for James Anderson, of Kaslo, who is agent for the owners; *Richmond-Eureka*, belonging to the Consolidated Mining and Smelting Company, was worked under lease by Con. Stewart and partners; *Rambler-Cariboo* was worked under lease by the late W. A. Cameron, a crew of eight or ten men being employed.

NEW DENVER.

Bosun. This property is owned and operated by the Rosebery-Surprise Mining Company, of which J. P. McFadden is general superintendent. Exploration from the sixth level, beyond the faulted zone and farther in the hill than any of the other workings, encountered a new ore-body, the development of which is being undertaken. The ore produced during the year was from company and leasing operations.

Molly Hughes. This property, situated on Slocan lake and owned by H. Clever, of New Denver, was taken under option by Vancouver interests and operated for a few months under the management of F. Flick. Improvements were made to the plant, but results obtained from underground work were evidently not very encouraging, so the mine was closed down during the summer. The values are confined to narrow widths; hence skilful mining and a minimum of overhead charges are factors necessary for the possible success of a proposition of this character.

Work at the *Mountain Chief*, *Mowich*, and a number of other small-scale operations were among the season's activities.

SILVERTON.

Standard. Leasers were again busy at this well-known mine and are reported to have struck a good showing of ore on the eighth level after spending a considerable sum on development. The mill was operated with George Gordon in charge. Dick Avison, Charlie Gill, George Gordon, and the Kelsall Bros. are among those who are working at the property under the terms of a lease.

Galena Farm. This property, which is owned by the Patrick Clarke Estate, of Spokane, was acquired by the Porcupine Goldfields Development and Finance Company under the terms of a lease and bond. Exploration by diamond-drilling and drifting is being carried on under the supervision of R. H. McLoughlin. The property has a good record of production and, should the continuation of the ore-bodies be found past the faulted zone, it should mean a lot to the Silverton camp.

Van Roi. This mine is owned and operated by Clarence Cunningham, of Alamo. The concentrator was closed down during the latter part of the season. However, recent prospecting has met with encouraging results and things look bright for next season.

Hewitt.—Work at this property was confined to leasing operations and a small tonnage was shipped to Trail.

Lucky Thought.—This property was also worked by leasers and a considerable tonnage shipped.

Among the numerous minor operations, the following properties had work done on them: *Buffalo Group*, *Monarch*, *Tiger*, *Mary Durman*, *Carbide*, *Tipperary*, *Big Dick*, *Fourth of July*, *Mascott*, *Metallic*, *L.H.*, and *Fisher Maiden*.

LIST OF SHIPPING-MINES IN THE SLOCAN MINING DIVISION, 1925.

Mine.	Locality.	Tons.	Character of Ore.
Antoine	McGuigan basin	7	Zinc, silver, lead.
Apex	New Denver	28	Silver, lead.
Bosun	Sandon	723	Silver, zinc, lead.
Buffalo	Silverton	23	Silver, zinc.
Corinth	Sandon	18	Silver, lead.
Galena Farm	Silverton	614	Silver, zinc, lead.
Hewitt	Silverton	1,800	Silver, zinc, lead.
Lucky Jim	Zincton	6,800	Silver, zinc, lead, gold.
Lucky Thought	Silverton	4,250	Silver, zinc, lead.
Mammoth	Silverton	5	Silver, lead.
McAllister	Three Forks	999	Silver.
Mollie Hughes	New Denver	34	Silver, gold.
Monitor	Three Forks	182	Zinc, lead, silver, gold.
Mountain Chief	Alamo	93	Silver, lead, zinc.
Mowitch	Alamo	9	Silver.
Number One	Sandon	19	Lead, silver.
Queen Bess	Alamo	80	Lead, silver, gold.
Rambler	Rambler	3,600	Silver, zinc, lead.
Ruth-Hope	Sandon	707	Silver, lead, zinc, gold.
Silversmith	Sandon	36,779	Silver, lead, zinc, gold.
Surprise	Sandon	153	Silver, lead, zinc.
Van Roi	Silverton	4,200	Lead, silver, zinc.
Canadian	Sandon	30	Silver, lead.
Victor	Sandon	45	Silver, lead, gold.
Washington	Sandon	2	Silver, lead.
Wonderful	Sandon	3,286	Silver, zinc, lead, gold.
Total		64,486	

SLOCAN CITY MINING DIVISION.

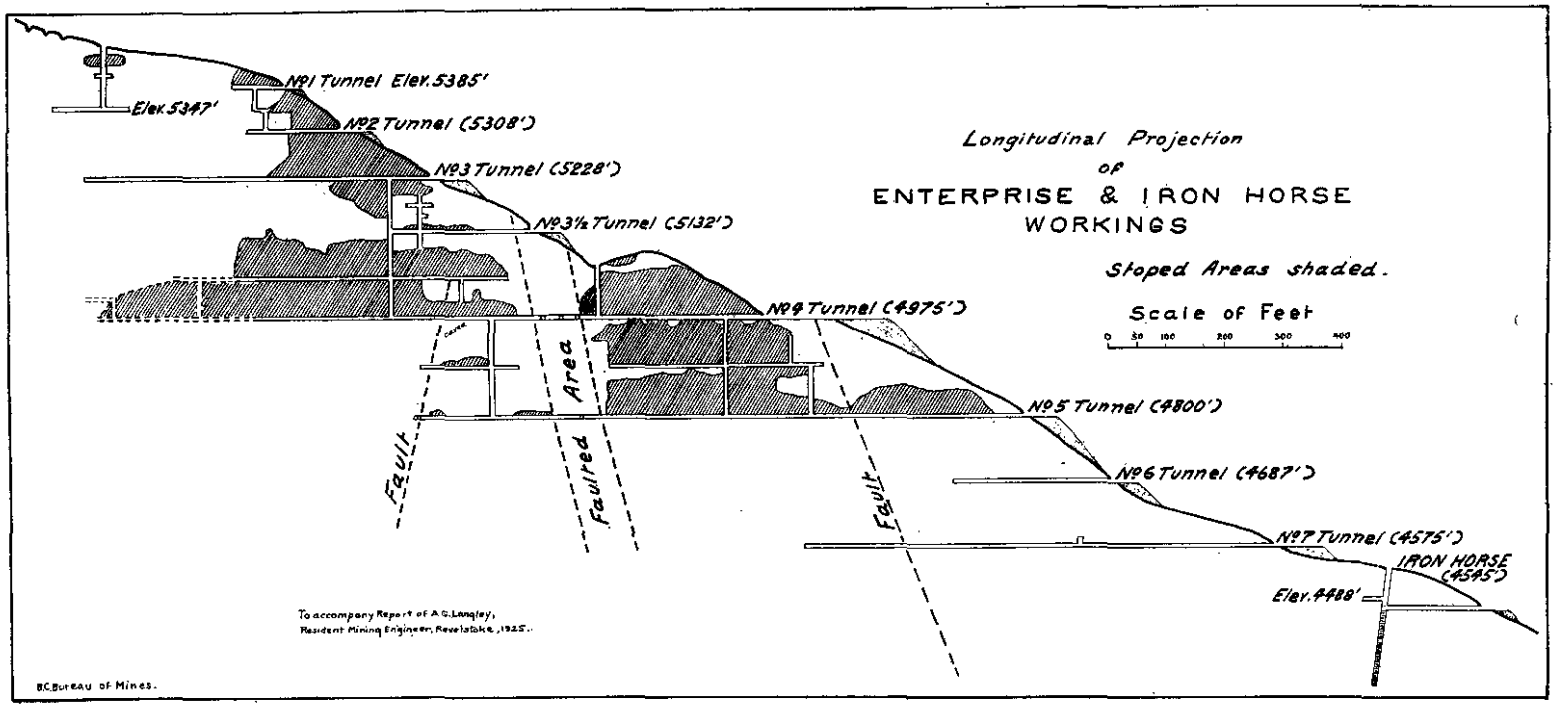
The activities during the season were mostly confined to a number of minor operations, the most important event being the reopening of the *Enterprise* mine, at which the initial operations have been attended by satisfactory results.

The *Anna Group* on Springer creek was worked in a small way by the owner, K. Zimmerman. The *Ottawa*, owned by the Consolidated Mining and Smelting Company, was worked under lease. Mike Murphy put in a season at the *Royal* group at the head of the North fork of Enterprise creek. E. Shannon did further work at the *Peg Leg* and made a small shipment of silver-lead ore. This property, formerly known as the *Neepawa*, adjoins the *Enterprise*. D. B. O'Neail made a small shipment of silver-lead ore from the *L.T.*

Enterprise. This property, which is situated on Enterprise creek, was operated during the year under the supervision of P. McGuire, who with E. C. Wragge, of Nelson, has it under option. The mine is referred to in the Annual Report for 1924, so only a few brief notes will be submitted.

Being somewhat short of working capital, operations were confined to mining ore from the lower or No. 7 level. On this level three stopes have been started. The No. 1 stope is 35 feet long and 15 feet high; the No. 2 stope is 143 feet long and 25 feet high; and the No. 3 stope 32 feet long and 10 feet high. The following shipments are reported to have been made from this level: 125½ tons assaying: Silver, 16.7 oz. to the ton; lead, 9.4 per cent.; zinc, 24.2 per cent.; and 170½ tons assaying: Silver, 22.17 oz. to the ton; lead, 10.6 per cent.; zinc, 27.1 per cent. From the No. 5 level one car was extracted from the surface just above the portal of the tunnel, which gave the following returns: Silver, 73.8 oz. to the ton; lead, 16.4 per cent.; zinc, 13.9 per cent. The ore shipped was of milling grade and was concentrated at Trail, with results which are said to have been very satisfactory.

The flume was repaired and the compressor was in use during the season, while a number of minor improvements were made to facilitate the handling of the ore. Other work consisted


No1 Tunnel Elev. 5385'
Elev. 5347'
No2 Tunnel (5308')
No3 Tunnel (5228')
No3½ Tunnel (5132')
No4 Tunnel (4975')
No5 Tunnel (4800')
No6 Tunnel (4687')
No7 Tunnel (4575')
IRON HORSE (4545')
Elev. 4488'
Fault
Faulted Area
Fault
Longitudinal Projection
of
ENTERPRISE & IRON HORSE
WORKINGS
Stoped Areas shaded.
Scale of Feet
0 50 100 200 300 400
To accompany Report of A.G. Langley,
Resident Mining Engineer, Revelstoke, 1925.
B.C. Bureau of Mines.

of advancing the tunnel on the No. 2 vein for a distance of 75 feet, from which workings 9 tons of ore was extracted. It is reported that the No. 5 level is being put in shape with a view to also carrying on operations from these workings.

LIST OF SHIPPING-MINES IN THE SLOCAN CITY MINING DIVISION, 1925.

Mine.	Locality.	Tons.	Character of Ore.
Anna	Springer creek	2	Silver.
Enterprise	Enterprise creek	324	Silver, lead, zinc.
L.T.	Springer creek	8	Silver, lead.
Peg Leg	Enterprise creek	10	Silver, lead.
Ottawa	Springer creek	8	Silver.
Total		352	

NELSON MINING DIVISION.

During the earlier part of the year the prospects for increased activities in the Sheep Creek gold camp looked promising, it being understood that supposedly strong American interests who acquired the *Reno* under option were going ahead with an active development campaign, but the capital was not forthcoming and little was accomplished at the property. However, generally speaking, there has been pronounced activity in the Division and owing to the advent of strong mining companies prospects look bright for next season.

Among events which are worthy of particular mention are the following: The Consolidated Mining and Smelting Company has again turned its attention to the *Hunter V.*, which has been dormant for many years; here a tunnel is being driven under the old workings, a crew of eight men being employed. This company has also a crew of men at work on the development of the *Boulder City* group between Ymir and Salmo.

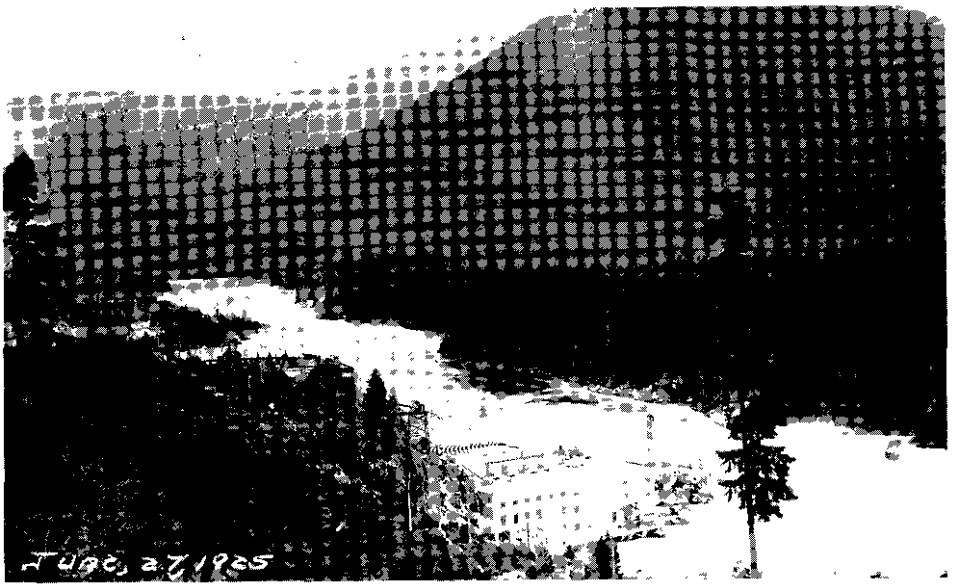
The Victoria Syndicate, of London, is driving a 900-foot crosscut at the *H.B.* mine on Sheep creek. This tunnel will gain a depth of 300 feet below the No. 2 or main level of the old workings. A semi-Diesel engine and compressor have been installed; Harold Lakes is in charge of the work. In past years the property produced a considerable tonnage of zinc ore, in the form of oxides, carbonates, and silicates of zinc, as well as some lead ore. The zinc ore, not being amenable to the electrolytic process at Trail, was shipped to the United States. The mine was last operated in 1917, when 1,502 tons of zinc ore was shipped to American smelters. The property is fully described in the Annual Report for 1915 by John D. Galloway.

Other work being undertaken by the Victoria Syndicate consists of exploration with two diamond-drills in the Pend d'Oreille area near the International Boundary; the properties taken under option being the *International* group, owned by R. M. Reeves, and the *Drumlummon* group, owned by J. H. McDonald.

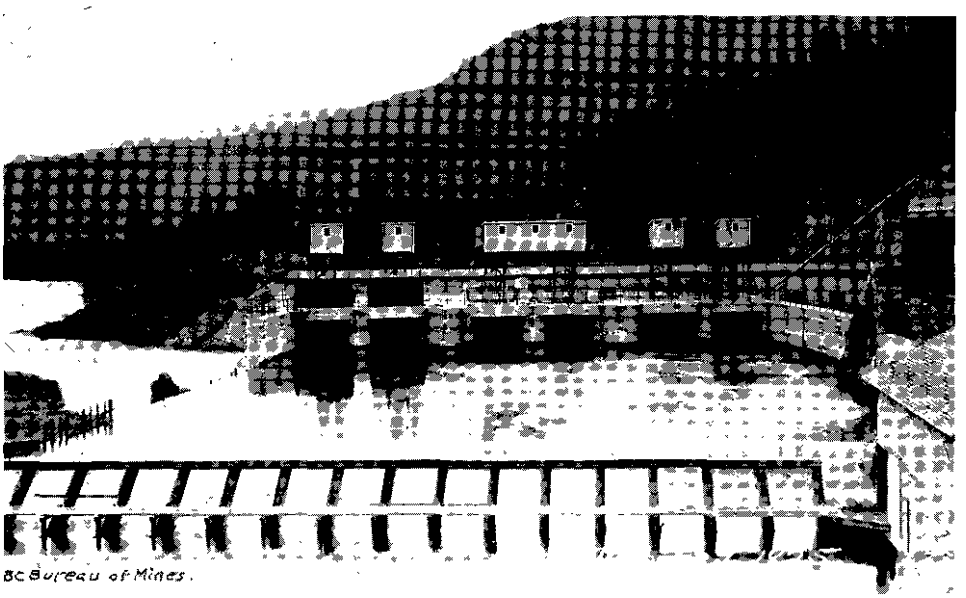
The Porcupine Goldfields Development and Finance Company acquired the *Goodenough* group at Ymir under option and is proceeding with development-work. Initial work consists of driving a crosscut to intersect the vein at a depth of 150 feet below the present workings. A compressor and oil-engine have been installed, new buildings erected, and 1 mile of road connecting the mine with the old Ymir road was built with the aid of assistance from the Government. Reference to the property may be seen in the Annual Reports for 1923 and 1924.

The *Red Bird* group, situated on the south side of the Pend d'Oreille river and owned by S. Coulter and A. J. Campbell, is reported to have been acquired by Conrad Wolfle and associates, of Spokane, who had a small crew employed during the year. The property is referred to in the Annual Report for 1924.

Among numerous other activities in the Nelson area may be mentioned the following: The Laib Bros., who own the *Spokane* group on Canyon creek, spent the greater part of the season in widening the trail from Kootenay lake to their property, for which they received assistance from the Department of Mines. The *Fern*, *Gold Hill*, and *Gold King* properties were operated in a small way and shipments made to Trail. Work was also done on the *Granite-Poorman*, *Central*, and *Golden Eagle*. The *Molly Gibson*, owned by the Consolidated Company, was worked under lease by the late W. A. Cameron. R. W. Yuill did further work on his claims at Lockhart creek and J. Tiyo succeeded in bonding his property on Duck creek to L. K. Armstrong and



Bonnington Falls, Kootenay River.



West Kootenay Power and Light Co., Bonnington Falls.

associates, of Spokane. J. W. Mulholland put in a season prospecting on the east side of Kootenay lake and brought in some nice specimens.

At the *Emerald* mine on Sheep creek work was principally confined to systematic exploration and development with a view to larger-scale production. The property has a good record of productive activity extending over a period of years. During the year about 942 tons of lead and 60 tons of zinc concentrates were shipped to Trail.

The iron-deposits near Kitchener are reported to have been carefully examined on behalf of W. R. Wilson, of Fernie, who is interested in the possible development of an iron and steel plant in conjunction with Crowsnest coalfields, where first-class metallurgical coke is available.

An event that marks the progress of mining in a most realistic way was the official opening of the new power plant of the West Kootenay Power and Light Company at Bonnington on August 1st by the Hon. T. D. Pattullo, Minister of Lands. The hydraulic installation provides for 60,000 horse-power. The present electric equipment consists of two units of 20,000 horse-power each. It is understood that arrangements are under way to install the third unit.

This splendid installation, representing the latest word in hydro-electric engineering, reflects great credit on Lorne A. Campbell, who has successfully guided the destiny of this company for so many years. The power derived is mostly consumed by the Consolidated Mining and Smelting Company at its great metallurgical works at Trail, the increased capacity of which has demanded more power than hitherto available.

To appreciate the immensity of this undertaking, the following figures are quoted: Preparation for the installation necessitated the excavation of 128,559 cubic yards of solid rock, the use of 48,000 yards of concrete, involving 203,664 sacks of cement and 80,000 lb. of powder; the demolition of the old No. 1 plant of 4,000 horse-power and 3,000 feet of industrial railway.

The Chamber of Mines of Eastern British Columbia, with headquarters at Nelson, succeeded in getting together a very creditable collection of ores from the district, which were placed on exhibit at the Nelson Fair and at Spokane during the North-west Mining Convention. On each occasion the exhibit was in charge of J. W. Mulholland and at Spokane created a great deal of interest; in fact, it was considered to be one of the outstanding features of the convention.

Porcupine. This group, comprising seven claims and owned by E. Kaukedahl, E. Gille, and Nels Peterson, is situated on Porcupine creek at a distance of about 1½ miles by road from the railway. The road has been burnt over and needs repairing, which could be done at small expense.

The area covered by the claims is underlain by rocks of the Pend d'Oreille group, which have been intruded by granitic tongues of the Nelson batholith. The ore-deposition occurs in the zone of contact between the igneous and sedimentary rocks. Several open-cuts have exposed promising showings, but not enough work has been done to establish their relation to one another or to throw much light on the continuity of the ore in any one direction. The geology is decidedly complex and it is thought that cleaning the overburden off by means of ground-sluicing in the spring would be the most inexpensive and satisfactory way of prospecting. By this method information might be gained which would be a most useful guide in carrying out further development. The ore is a mixture of galena, zinc-blende, and pyrite in a siliceous gangue. Samples from a few sacks of sorted ore taken from the open-cuts gave the following average values: Gold, 0.09 oz.; silver, 14.4 oz. to the ton; lead, 18.9 per cent.; zinc, 2.4 per cent.

Work was being confined at the time of examination to the reopening of an old tunnel which had been driven from the creek-level. A small cabin has been built near the workings and three or four men were employed during the season.

Alice. This group, consisting of three claims—the *Alice*, *Alice Fraction*, and *Morning Star*—is situated on the Crowsnest branch of the Canadian Pacific Railway at a distance of about 2 miles north of Creston and at an elevation of about 1,500 feet above the railway. The property was previously operated some twenty years ago, when an aerial tramway and concentrator were erected; milling was started in September, 1904, and continued through 1905, since which time there is no record in the Annual Reports of continuous operations. The old mill is now dismantled and the tramway no longer exists. During the year the property was acquired by the Porcupine Goldfields Development and Finance Company under the terms of a lease and bond. The old upper workings, which were inaccessible when the property was visited in June, are described in the Annual Report for 1904.

Surface work during the early part of the year disclosed a quartz vein, lying apparently at about 80 feet to the west of the vein already developed. This vein was well mineralized in places with galena and the exposures appeared sufficiently promising to warrant further exploration at depth, so it was decided to explore its downward continuation by crosscutting from the lowest of the old workings, situated at about 180 feet farther down the hill. Several old open-cuts and a shallow shaft bear evidence that this occurrence was not unknown in earlier days. The lowest level of the old workings consists of a 500-foot crosscut from the surface and a considerable amount of drifting. The vein, having a width of about 4 feet, cuts a slate and quartzite formation, of which foldings and slips are a pronounced feature of the structural conditions. The ore, consisting of galena in a white quartz gangue, appeared to be "bunchy" in occurrence, but conditions appeared to be sufficiently favourable to warrant further development. A sample of sorted ore gave the following returns: Gold, trace; silver, 16.9 oz. to the ton; lead, 42.2 per cent.; zinc, 0.6 per cent.

At the time of examination a crosscut was being driven to cut the downward projection of the westerly vein. According to recent reports from the company, prospecting is being continued from the lower level and preparations are being made to ship a small tonnage. H. Dimmock is in charge.

George Young put in a season prospecting at the *Tenas Sun* group near Kitchener and further work was done at the *Leadville* group on Goat river.

Beaver Creek Mines.*

This property, consisting of the *Winnie* and *Harold* (both Crown-granted), *Violet, Morning Glory, Beaver, Beaver Creek, Shamrock,* and *Fleur de Lis* claims, is situated to the east of Beavervale creek about 1½ miles northerly from the Great Northern Railway at Ross Spur. Originally staked in 1895 by J. Caron, the property was bonded by him last spring to H. H. Sawyer, representing the Beaver Creek Mines Syndicate.

The workings, consisting of a 30-foot shaft and numerous trenches, extend along a low hog-back ridge composed of schists and porphyritic rocks of the Rossland volcanic group. The contact of this formation with the granite lies a short distance to the east.

The mineralization, chiefly consisting of low-grade disseminations of pyrite (auriferous), galena, and zinc-blende, is found in bands of highly siliceous rock which generally strike easterly and westerly across the trend of the ridge, with dips varying from 45° to 72° to the north. Occasional specks of free gold are also found in places associated with the sulphides. The width of the mineralization varies from 1 to 7 feet.

At the time of this examination development-work had not reached the stage where anything definite could be measured and a large amount of sampling would have been necessary to determine even approximately the grade of the material exposed in the numerous showings. To get some idea of the values to be expected a composite sample was taken from various places, which assayed: Gold, 0.41 oz.; silver, 4.4 oz. to the ton; lead, 1.8 per cent.; zinc, 3.2 per cent. Some of the ore also contains unimportant amounts of copper. At an elevation of about 1,000 feet above the railway-tracks and about 100 feet below the summit of the ridge a tunnel was being driven to crosscut the ore-zone.

Work done last summer includes the installation of a 1-drill Sullivan compressor and Vickers-Petter oil-engine, erection of a substantial log building to accommodate up to twenty men, and the construction of trails and a short spur road to connect with the road to Ross Siding. The property is very conveniently situated in regard to transportation and can be worked all the year round without interruption.

Gold Hub.*

This claim, recently acquired by J. Jeffrey and E. P. Haukedahl, is situated on the south-west end of Elise mountain at an elevation of about 2,300 feet above the Great Northern Railway tracks 2½ miles north of Ymir. A steep trail connects the workings with the railway at Tamarac Siding.

The old workings, consisting of a shallow shaft and some open-cuts distributed along the contour of the hill for some 200 feet, develop a quartz vein striking northerly and dipping flatly into the hill. This vein where seen averages 16 inches in width and is mineralized with oxidized and decomposed arsenopyrite containing gold values. The country-rock is granite-porphyry schist. Two samples across widths of 16 inches of vein assayed $48 and $22 in gold to the

ton respectively. About 40 feet vertically below the outcrop of the vein a crosscut tunnel had been driven 125 feet without encountering the vein.

Since the property was visited a car-load of ore is reported to have been shipped to the Tacoma smelter. Subsequently work was temporarily suspended.

Bryan and Silver Champion.*

These old claims have been idle for many years, but were visited following an application for an examination. The claims are situated north of Champion creek, at an elevation of about 3,400 feet, on the eastern side of the Columbia river opposite Kinnaird Siding, south of Castlegar, and are reached by a logging-trail about 2 miles in length from the road. Both claims were Crown-granted in 1899, the *Bryan* being now held in the name of Margaret Ewing Fletcher and the *Silver Champion* under lease to A. C. Black.

The country-rock is granite near the contact with rocks of the Rossland volcanic group which lie a short distance to the west. The old workings, consisting of shallow shafts and trenches enclosed within a length of about 100 feet along the outcrop on gently sloping ground, develop a vein from 4 to 5 feet wide, striking northerly and southerly and dipping about 50° to the west.

The vein-filling is quartz containing inclusions of country-rock. The quartz, which is considerably leached and decomposed, contains masses and disseminations of pyrite and marcasite and pockets of oxidized earthy material. Assays of the sulphide ore failed to give any appreciable values, but a sample of the earthy decomposed material gave an assay of: Gold, 1.04 oz.; silver, 4.4 oz. to the ton. Another sample taken across a width of 4 feet of quartz and iron sulphides assayed: Gold, 0.02 oz.; silver, 0.8 oz. to the ton. These results indicate that there are no commercial values over any appreciable width, but that the values are confined to small pockets and streaks in the vein where local concentration of gold and silver has occurred through oxidizing agencies.

Iva Fern.*

As numerous references have been made to this property in previous Annual Reports, it is only intended to give a short summary here of the work done since the property was last described in the Annual Report for 1919. The *Iva Fern*, owned by Jack Mulholland, who staked it originally, and A. B. C. Dando, who has recently acquired an interest, is situated on Cultus creek, about 7 miles from Kootenay lake. The ore contains values in silver, lead, zinc, and copper. The property was bonded by the Consolidated Mining and Smelting Company in November, 1917, and developed by them in 1918 and 1919. Work done by this company included a considerable amount of surface-trenching and the driving of some 250 feet of tunnel to crosscut at depth the veins, of which there are three. Work was discontinued before the objective was reached, however, and the property was shut down during the following two years. In 1922 the Standard Silver Lead Mining Company continued the crosscut tunnel for a further 250 feet to its intersection with the principal vein, which was then drifted on northerly for 120 feet. A short tunnel was also driven lower down the hill on the *Iva* claim. In 1923 work was discontinued by this company and nothing of importance has been done since.

All the development-work done on the *Iva Fern* property is localized towards the summit of the ridge. The claims cover a large area, and although the mineralized zone has been traced for a long distance little work has been done at lower altitudes and much ground remains to be prospected. The drift on the main vein off the crosscut tunnel was stopped before reaching a point vertically below the strong surface showing exposed in the shaft and the trench just south of it.

LIST OF SHIPPING-MINES IN THE NELSON MINING DIVISION, 1925.

Mine.	Locality.	Tons.	Character of Ore.
Emerald	Salmo	6,283	Lead, zinc, silver.
Golden Eagle	Taghum	3	Silver, lead, gold.
Gold Hill	Taghum	13	Gold, silver.
Gold Hub	Ymir	27	Gold.
Granite	Granite	375	Gold, silver.
Fern	Hall	22	Gold.
Total		6,733	

TRAIL CREEK MINING DIVISION.

ROSSLAND.

Operations at the mines of the Consolidated Mining and Smelting Company were greatly curtailed during the year and, according to reports from headquarters, the large amount of diamond-drilling done on outlying claims did not meet with very encouraging results; while underground, stoping operations are reported to be practically negligible and a large amount of underground equipment is being salvaged. At the present time development consists of the expansion of drifts into new territory south and west of the present workings.

Conditions do not appear to be very encouraging at present, but the company can be depended on to exhaust all possibilities before abandoning their search for new ore-bodies. The average number of men employed is about 110.

Velvet. This mine is owned by the Rossland-Velvet Mines, Limited, of which E. Nordman is president and A. W. Gregory secretary. The company is composed largely of experienced mining men, who acquired the property a few years ago. The mine is situated on the Rossland–Cascade highway at a distance of 11 miles west of Rossland.

The ore carries values in gold, silver, and copper, running up to about $40 a ton. A considerable amount of development was first done in the nineties and the mine has a fairly substantial production to its credit. Formerly it was greatly handicapped by its distance from transportation and the cost of steam-power for mining and milling requirements. Now, however, the new road has greatly obviated the transportation difficulties, while electric power is obtainable from Rossland. Another important feature in the economic operation of the property is the free drainage of the workings now afforded by the long crosscut, just completed, which gains a depth of about 250 feet below the sixth or lowest level. This tunnel is 1,730 feet long and the fifth and sixth levels, which were previously under water, are now dry. A recent report received from the company states that repairs have been made to the shaft and gallows frame and breaking ore on the third and fourth levels was started during the latter part of the year. A description of the property may be seen in Memoir 77 of the Geological Survey, Canada, by C. W. Drysdale.

I.X.L. This property, situated within a short distance of Rossland, has been worked by leasers during the last five years. It is famous for the exceptionally high-grade gold ore it has produced; in fact, it has yielded some of the most spectacular specimens of gold quartz of any property in the Province. The total value of the ore shipped by the leasers is not known at the time of writing, but it amounts to many thousands of dollars and handsome profits have been reaped.

Unfortunately badly faulted ground was encountered at depth and the downward continuation of the vein was lost some 50 feet below the No. 3 level. During the year work was necessarily of an exploratory nature and no effort is being spared to exhaust the possibilities of discovering the continuation of the vein beyond the faulted zones.

On the No. 1 level crosscutting and diamond-drill by hand have so far failed to reveal its continuation. On the third level a 200-foot crosscut was driven to develop a quartz vein cut by a diamond-drill hole; this, however, only turned out to be a broken section of vein, not much longer than the width of the tunnel. Further work was being done on this level in hopes of picking up the vein farther in the hill.

At the *Midnight* and *O.K.*, which adjoin the *I.X.L.* on the easterly and westerly sides respectively, a considerable amount of exploratory work has been done to pick up the extension of the *I.X.L.* vein. These two properties are using air from an electric-driven compressor installed at the *Midnight*.

Work at the near-by properties—namely, the *Gold King* and *Golden Drip*—has been continued during the season. The above properties are referred to in previous reports.

John Tomich put in a season at the *Cariboo* and Malcolm McIvor is reported to have been working on his claims at Murphy creek.

TRAIL REDUCTION-WORKS.

This plant, owned and operated by the Consolidated Mining and Smelting Company of Canada, is situated on the Columbia river, adjacent to the town of Trail. Immediately around the works and in the precincts of the company's property are a number of dwellings occupied by

company officials and employees, forming the municipality of Tadanac, which is the name of the railway-station at the plant and also that of the registered trade-mark of the company.

At this great plant all the gold, silver-lead-zinc, and copper ores of this district, as well as the ores from the Boundary district and a considerable tonnage from outside points, are smelted and refined.

During the years following the successful development of the *Sullivan* mine it has undergone extensive alterations and additions, until now it ranks high among the greatest metallurgical plants of the world.

Historical.—Initial construction was started in 1895 by the British Columbia Smelting and Refining Company, controlled by F. Augustus Heinze, of Butte. A narrow-gauge railway then served as a connection with the Rossland mines, at that time the chief source of supply, for then it was only a copper-smelter; the first lead-furnace not being blown in until 1899. At about this time the Canadian Pacific Railway Company bought out the Heinze interest, "lock, stock, and barrel," and the Canadian Smelting Works was formed to operate the plant. In 1906 the Consolidated Mining and Smelting Company of Canada was incorporated and took over the interests of the latter company. Since this time efficient and competent management has marked the career of the enterprise, both in the practice of mining and metallurgy; this statement is made without any reflection on the earlier operations.

The urgent demand for zinc by Great Britain and her allies during the Great War was largely responsible for energetic and aggressive action on the part of the company to produce this metal, and with this object in view the erection of an electrolytic zinc-refinery was commenced and rushed to completion in 1915 and put into operation in February, 1916.

This marked the beginning of a new era for the company, which then, naturally, had not only to turn its attention to solving the problem of recovering the values in the complex ores of the now world-famous *Sullivan* mine, but also had to face the many problems in connection with the various phases of the electrolytic refinement of zinc, which was at this time in the experimental stage.

Results were accomplished in 1916 which allowed regular shipments of zinc ore from the *Sullivan*, but it was not until four years after that the problem of concentration was satisfactorily solved by the application of oil-flotation methods; since this time the production of silver, lead, and zinc has rapidly increased.

The plant covers an area of 250 acres and includes a lead-smelting plant, a copper-smelting plant, an electrolytic zinc plant, electrolytic lead and copper refineries, a gold and silver refinery, a hydrofluoric and hydrofluosilic acid plant, a bluestone plant, a sulphuric-acid plant, and a copper rod-mill. To add to its completeness and in order to make it as self-contained as possible numerous improvements have been made in the way of accessory equipment, among the most important of which is a modern machine-shop and foundry, in which are manufactured nearly all the mechanical appliances used in the process of concentration and reduction of the various metals.

The large concentrator formerly used for the *Sullivan* and Rossland ores has been partially converted for the treatment of customs ores, which are now being received for treatment in increasing quantities.

The personnel of the chief officials of the technical staff at Trail is as follows: S. G. Blaylock, general manager; T. W. Bingay, comptroller; W. M. Archibald, mines manager; R. W. Diamond, superintendent of concentration; James Buchanan, superintendent of the smelter; B. A. Stimmel, superintendent of zinc plant; J. J. Fingland, superintendent of refineries; G. F. Chapman, mechanical superintendent; E. M. Stiles, chief engineer; F. E. Lee, chief of research.

The following general description of the plant is only intended to convey an idea of its salient features, dealing more particularly with the lead plant, but avoiding details as much as possible.

Production.—The estimated tonnage treated in 1925 is as follows: From company mines, 340,710 tons; from customs shippers, 39,570 tons; total, 380,280 tons.

Estimated production for 1925 is as follows: Gold, 21,352 oz.; silver, 4,397,455 oz.; copper, 950 tons; lead, 117,504 tons; zinc, 48,611 tons. The value of this production is placed at $29,973,453, as compared with $16,882,129 of last year.

Lead Plant.

The ores treated in this plant are to a very large extent derived from the numerous properties in this district, supplemented by those of the Boundary district, with occasional shipments from other parts of the Province. By far the greater bulk of ore which arrives at the smelter is in the form of silver-lead-zinc concentrates, most of which comes from the *Sullivan* mine. The *Sullivan* lead concentrates have an average analysis of: Silver, 20 oz. to the ton; lead, 66 per cent.; zinc, 6.3 per cent.; sulphur, 18.8 per cent.; silica, 1 per cent.; iron, 7.5 per cent.

The zinc residue from the leaching plant, of which a considerable tonnage is smelted per day, has the following analysis: Silver, 4.8 oz. to the ton; lead, 10.9 per cent.; zinc, 19.1 per cent.; sulphur, 3.5 per cent.; silica, 2.4 per cent.; iron, 37 per cent.; manganese, 0.6 per cent.

The ores are first delivered by railway-cars to the bins of the sampling-mill, from which the crushed material, emerging on one belt, discharges over a sampler. This sampler is said to give excellent results, being both accurate and flexible. It consists of three buckets spaced at equal intervals between two carrying-chains which move through the stream of discharged ore at right angles to the centre line of the belt-conveyor. Each bucket cuts 1/50 sample, which passes to a revolving table where the material is mixed and fed to a second sampler. The sample is then cut down on a Jones riffle to 200 lb., recrushed to 16-mesh, and a 40-lb. sample taken to the assay office. Concentrates finer than ¼-mesh are sampled by the fifth-shovel method, except when received in bottom dump-cars; sampling is effected by drilling auger-holes through the concentrates at regular intervals. All concentrates go direct to the Dwight-Lloyd bins.

After being mixed with the necessary flux the charge is sintered at the primary and secondary Dwight-Lloyd sintering-machines. It is then conveyed to the furnace storage-bins, weighed, and transported to the lead blast-furnaces. The fumes from the sintering-machines pass through a Cottrell treater on their way to the stack. The passage of the ore through the plant may be seen on the accompanying flow-sheet. The following data, taken from the paper presented by J. Buchanan and G. E. Murray at the meeting of the Canadian Institute of Mining and Metallurgy at Trail in October, 1923, are intended to give a few of the salient features of the method in vogue at this plant.

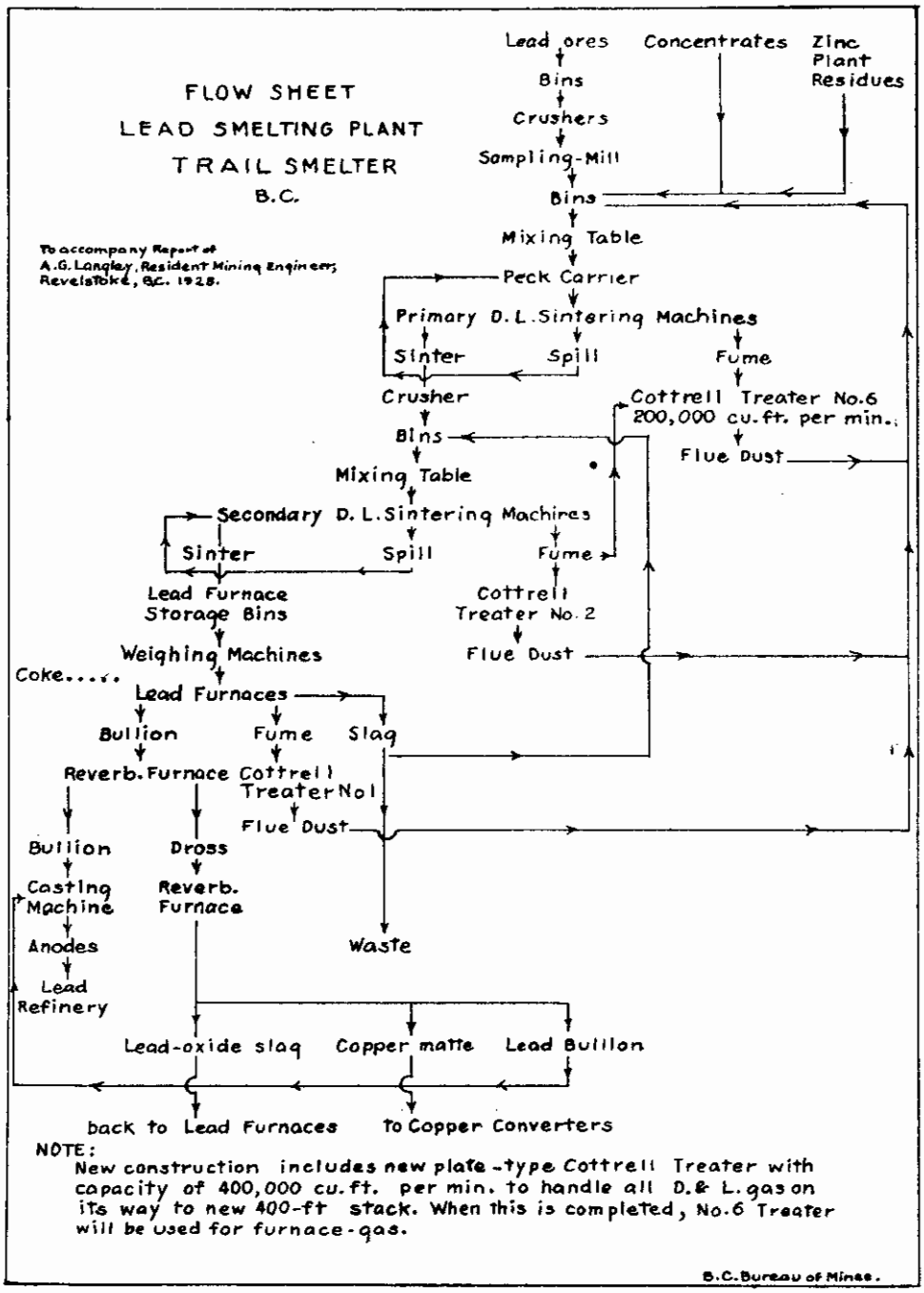
After stressing the difficulties to be contended with by the lead metallurgist, brought about by frequent changes in the grade of feed due either to methods of concentration or the character of the ores being mined, the authors deal with the methods employed which have greatly simplified matters and have been productive of satisfactory results. Emphasis is laid on the proper preparation of the charge before smelting, and in this operation the function of the Dwight-Lloyd machines is of paramount importance. The desired objective of these machines is to eliminate the sulphur in the charge. The first sintering reduces the sulphur content to 8 per cent. and the second sintering to 2 per cent. To the charge fed to the secondary machines about 13 per cent. of slag is added. The function of this slag is to mainly assist in the formation of a hard sinter; it also allows the operations to be continued when for some reason or other the primary sinter is too high in sulphur for the secondary machines. The Dwight-Lloyd machines are now being enlarged to double capacity.

As regards the blast-furnace practice, it is stated that the zinc-iron ratio is of the greatest importance in running a slag high in zinc. Given a sufficient amount of iron the whole question of smelting a charge high in zinc turns on the elimination of the sulphur, and if the charge is oxidized the furnace trouble is practically eliminated. At present the furnace-slag carries an average of 16 to 17 per cent. zinc.

Lead-smelter.—In the lead-smelter there are four blast-furnaces, the main dimensions being 180 by 50 inches at the tuyeres and 19 feet from tuyere-line to feed-floor level. The average tonnage of each is rated at 315 tons a day. The slag is granulated and conveyed to the slag-dump by launder. The fumes pass through a Cottrell treater on their way to the stack. Recent additions include a drossing plant, to which the lead bullion is conveyed by overhead electric cranes, and is first treated in a reverberatory furnace, from which the bullion is cast into anodes and the dross re-treated in a second furnace. The product of this latter is a copper matte or speiss, a lead-oxide slag, and lead bullion. The main object of this procedure is to eliminate the copper from the lead product. This plant has a rated capacity of 400 tons a day. The lead anodes, weighing about 360 lb. each, are transported in rack cars by an electric locomotive to the lead-refinery.

Lead-refinery.

This refinery has the distinction of being the first lead-refinery to use the Bett's process, which method was developed at Trail from a laboratory stage to a commercial success. The



capacity of the plant is 350 tons of refined lead a day. To give an idea of its size, the area of the lead tank-room is 84,968 square feet. The number of tanks is 956 and the power required is 2,800 kw. Briefly the process is as follows: The lead anodes are immersed in an electrolyte of 11

to 13 per cent. hydrofluosilicic acid and 6 to 9 per cent. lead. The tanks are arranged in cascades of seven, each tank having an inside dimension of 8.5 by 2.5 by 3.58 feet and holds 24 anodes and 25 cathodes. The voltage drop between the electrodes is from 0.23 to 0.5 volts; the average current density is 14.5 amperes a square foot of cathode area. The refined lead, which is deposited on the thin lead cathode sheet, is melted and cast into pigs, the finished product being 99.99 per cent. lead. The anode slimes, containing gold, silver, and impurities, go to the silver-refinery and the anode scrap is melted and recast. About 6 per cent. of the bullion is returned in the form of lead and bullion drosses to the smelter and about 3 per cent. recovered from slimes sent to the silver-refinery.

The major operations of the tank-room are done under contract, payment being for each series of operations and at its own specific rate. The tank-testers, cathode-bar cleaners, tank-cleaners, kettle-firemen, and slime-washers are all on day's pay.

Copper-refinery.

The rated capacity of this plant is 60 tons a day. The copper tank-room has an area of 24,650 square feet and that of the melting plant of 4,500 square feet. The number of tanks is 426 and the power required is 400 kw. The usual electrolytic refining practice is in use. The copper anodes from the refining-furnace at the copper-smelter are suspended in an electrolyte of sulphuric acid and copper sulphate. The cathodes are melted into ingots for shipment, the anode scrap goes back to the converters, the slime to the silver-refinery, and the impure electrolyte to the bluestone plant. In connection with the copper-refinery there is a 50-ton copper rod-mill.

Silver-refinery.

The production of Doré metal from the lead and copper tank-room slimes is effected in small magnesite-lined reverberatory furnaces, by which means the base metals, lead, copper, antimony, and bismuth, are eliminated by oxidation. The finished Doré metal is from 950 to 970 fine and contains 1.5 to 2.5 per cent. copper.

The parting is effected by the ordinary sulphuric-acid process. The gold sludges are removed to the gold clean-up kettle and treated with hot sulphuric acid till free from silver, washed sweet with water, dried, and melted for shipment. The clear silver solution is siphoned into precipitation-tanks, where, after dilution, the silver is precipitated on copper plates. This cement-silver is washed, dried, and melted into market-bars. The copper-sulphate solutions go to the bluestone plant, where they are evaporated to crystallization point.

The principal by-product of this refinery is antimony, which is recovered from the process of oxidation of the original melt and collected in settling-chambers in the form of oxide. Antimonial lead is also made from the retreatment of the slag from the original melt.

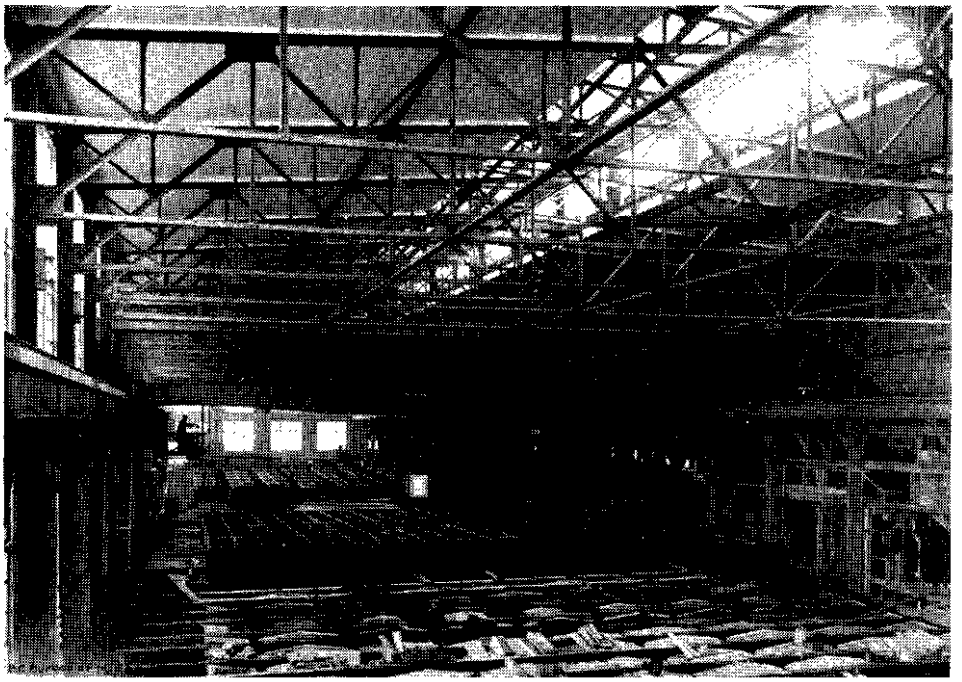
Electrolytic Zinc Plant.

At this plant all the zinc concentrates from the *Sullivan* concentrator at Kimberley are received for treatment, as well as customs zinc ores and concentrates, the latter being treated in a separate unit. The *Sullivan* zinc concentrates contain the following average values: Silver, 2.2 oz. to the ton; lead, 5.3 per cent.; zinc, 43.5 per cent.; sulphur, 33.2 per cent.; silica, 1 per cent.; iron, 19 per cent.; manganese, 0.4 per cent.

Roasting Plant.—The concentrates are fed to seventeen Wedge mechanical roasters of the seven-deck type, their function being to oxidize the zinc sulphide so as to render it soluble in dilute sulphuric acid. An interesting and very important feature in connection with the *Sullivan* ore is that the zinc occurs as marmatite, the isomorphous iron of which readily combines to form zinc ferrate, which is insoluble in dilute cold sulphuric acid, and hence, not being affected by the leaching process, forms a large proportion of the residue, which has to be smelted for the recovery of silver and lead. Sulphatizing the roast is avoided as much as possible, for this would create an excess of sulphuric acid in the leaching solutions.

The fumes from the roasters pass through a new flue, built in 1925. This flue is 420 feet long by 28.8 feet wide and 18 feet high (inside measurements) and is 10 feet above the level of the ground. The entire area of the bottom of the flue consists of hoppers, 475 in all.

Cottrell Treater.—After passing through this flue the fumes enter a Cottrell treater, also erected during 1925. This contains three flues through which the fumes pass. The equipment is contained in a building 104½ feet long by 78½ feet wide and 67½ feet in height, constructed of reinforced gunnite supported by steel framework.



Consolidated Mining and Smelting Co. of Canada—Lead-refinery at Trail.



Consolidated Mining and Smelting Co. of Canada Zinc Tank-room at Trail.

Each treater-flue, which is 15 feet in width, 12 feet in height, and 104 feet in length (inside measurements), is built for six sets of precipitating-plates, but only four sets of plates are required for the present operation. Each set of plates is made up of sixteen plates (10 by 12 feet) placed 12 inches apart, and made of corrugated Keystone steel (0.2 per cent. copper steel). The sets are hung in the flue with the plates parallel with the direction of the flow of gas. In the centre between the plates and running full length of the space between the plates are hung high-tension wires (5 inches apart) which are kept taut by lead weights.

Each set of plates is supported on the framework of the building on each of its four upper corners and under each support is placed a large spring. This spring allows the set of plates to vibrate when the supports are struck with a hammer. The vibration jars the precipitated dust loose from the plates and it falls into the hoppers below, of which the entire bottoms of the flues consist, there being 162 hoppers in all.

The high-tension wires are hung from a framework which is supported on four porcelain insulators placed on the outside of the flue. A light blow on the centre of the framework jars the dust loose from the wires. The voltage required for this treater is 60,000 volts.

Stack.—The gas passes from the treater into the base of a reinforced-concrete stack 409 feet in height and 21 feet inside diameter at the top. This stack is lined with a 4-inch wall of hard-burned brick its entire length. A 2-inch air-space is left between the brick wall and the concrete. A similar stack is now being erected for the lead-plant fumes.

Leaching-plant.—The hot calcine from the roasting plant is conveyed to the leaching plant by special spiral-screw pipe conveyors (evolved by the staff), where it enters the leaching solution. In the leaching method used at Trail there are two distinct circuits, the "acid" and the "neutral." All the hot calcine enters the "neutral" circuit and by making it alkaline has the effect of precipitating the ferric iron along with antimony, arsenic, and other impurities. The solids from the "neutral" circuit pass through the "acid" circuit, where they are treated with returned acid electrolyte, which is regulated to ½ to 1 per cent. of sulphuric acid to ensure the dissolving of all the soluble zinc. The zinc residue from the "acid" circuit, after washing and filtering, is stacked in great piles outside the plant and is finally smelted at the lead blast-furnaces. Its analysis is given as follows. Silver, 4.8 oz. to the ton; lead, 10.9 per cent.; zinc, 19.1 per cent.; silica, 2.4 per cent.; iron, 37 per cent.; manganese, 0.6 per cent.

The effluent solution from the "neutral" circuit, after being treated by zinc-dust to precipitate the copper and cadmium and clarified by filtering, is ready for electrolysis.

Electrolytic Plating Department.—The electrolyte, containing about 8 per cent. sulphuric acid, flows through a number of cells, each cell being 27 by 80 by 42 inches (inside dimensions) and containing 17 lead anodes and 16 aluminium cathodes. The cathodes are 24 by 36 by 0.1 inches and are spaced 4 inches centre to centre. The current density is from 26 to 27 amperes per square foot and the voltage drop is about 3.5 volts.

The plating of the zinc is done in three large buildings, as follows: No. 1 building contains 14 units of 36 cells each (504 cells); No. 2 building contains 12 units of 36 cells each (432 cells); No. 3 building contains 5 units of 144 cells each (720 cells).

No. 1 and No. 2 buildings are equipped with motor generator sets, each set consisting of one motor and two generators. The motors are 2,200-volt synchronous motors, requiring 1,150 k.v.a. at full load. The generators are 500-kw. machines producing 4,000 amperes at 125 volts. One generator produces the current required by one unit of 36 cells.

No. 3 building is equipped with five synchronous converters. Each converter produces power required for one unit of 144 cells, which is 4,500 amperes at 550 volts (2,500 kw.). Each converter has its own transformer, the power being transformed in one step from 60,000 volts to 380 volts, which is the voltage required for the converter. The direct-current voltage required for a unit of 144 cells is about 510 volts and the converters are constructed with a booster which gives a boost or a buck of 40 volts, thus giving a range of from 470 to 550 volts.

The converter-room and generator-rooms are supplied with cool washed air, each building having its own air-washing plant.

The No. 3 building and its electric equipment were completed during 1925.

The power requirement for the zinc plant is 28,000 kw. and for other parts of the Trail plant is 11,000 kw., making a total of 39,000 kw. or 52,200 horse-power. This power is developed at Bonnington Falls by the West Kootenay Power and Light Company, a subsidiary company of the Consolidated Mining and Smelting Company.

Melting and Casting.—The zinc sheets, which are stripped from the aluminium cathodes, are weighed, stacked on small trucks, and taken to the melting-room. Here they are melted in reverberatory furnaces, from which the molten zinc is dipped by a large ladle and cast into bars. The product from the plant is 99.956 per cent. zinc. The rated capacity of the zinc plant is about 200 tons a day.

Copper-smelter.

The principal sources of supply for this plant are the company's mines at Rossland and the Allenby Copper Company's property at Allenby. Only a small tonnage is being won from the Rossland properties at the present time and this arrives at the smelter as crude ore, while the product of the Allenby Copper Company arrives in the form of flotation concentrates, which necessarily require sintering before treatment in the blast-furnaces.

Briefly, the plant consists of three copper blast-furnaces, two 54- by 420-inch and one 42- by 210-inch; two converters of the Great Falls type 12 feet in diameter; a reverberatory refining-furnace and anode casting-machine. The sampling-mill in connection with this plant is equipped with Vezin samplers and gyratory crushers, while Dwight-Lloyd sintering-machines are available for the treatment of copper concentrates.

Co-operation with the workmen is aimed at by the company, which in 1923 inaugurated a scheme by which workmen's co-operative committees were formed for the purpose of investigating all labour troubles and making recommendations to the management. This has proved to be a great success in helping to adjust all matters pertaining to the welfare of the employees.

A system of bonuses based on group cost and increasing recoveries and on the price of lead and zinc was also established. By this system the workmen reap a benefit according to the operating efficiency of the plant. The total number of men employed at the plant is 2,100.

The data contained in the above brief description of the Trail plant have largely been obtained from papers presented by the staff at the meeting of the Canadian Institute of Mining and Metallurgy held at Trail in October, 1923, and from information freely supplied by S. G. Blaylock and chief officials of the company.

For further information refer to: Transactions of the Canadian Institute of Mining and Metallurgy, Vol. XXVII., 1924. Chem. & Met. Eng., August 11th, 1920. Engineering and Mining-Journal Press, July 28th, 1923.

LIST OF SHIPPING-MINES IN THE TRAIL CREEK AND LARDEAU MINING DIVISIONS, 1925.

Mine.	Locality.	Tons.	Character of Ore.
Golden Drip	Rossland	5	Gold, silver, copper.
I.X.L.	Rossland	87	Gold, silver.
Consolidated Co.'s properties	Rossland	37,504	Gold, copper, silver.
Dunvegan	Lardeau	7	Silver, lead.
Total		37,603	

REVELSTOKE, LARDEAU, AND TROUT LAKE MINING DIVISIONS.

The season has witnessed a decided revival in the interest taken, particularly by outside capital, in the potentialities of this northern section of the district, as manifested by the numerous examinations made by visiting engineers representing large interests. Few known properties of merit escaped examination and a repetition of these conditions may be expected next season.

The work undertaken during the year at numerous properties was of an exploratory nature, very little ore being mined for shipment, but it is anticipated that before long new names will be added to the rapidly swelling list of shippers of District No. 5.

REVELSTOKE MINING DIVISION.

J. & L. Group. This property was acquired under option by the Porcupine Goldfields Development and Finance Company. Extensive tests are now being made on the ore with a view to solving its economic treatment; it is a complex mixture of iron, lead, and zinc sulphides carrying values in gold, silver, lead, and zinc, with which is

associated an appreciable percentage of arsenic. The property is described in the Annual Report for 1922.

Woolsey Group. This property, now comprising about thirty-six claims, was acquired by the Bernier Metals Corporation, of Vancouver, with an authorized capital of $2,000,000. During the summer work was mostly directed towards the improvement of the trail; later in the year a low tunnel was commenced, new camp buildings erected, and preparation made for the installation of an oil-engine and compressor. Work was being continued through the winter months with a crew of eighteen men. R. F. Hill is the engineer in charge. The property is described in the Annual Reports for 1918 and 1919.

OTHER PROPERTIES.

The *Lanark* mine, which has been operated during recent years by W. B. Dornberg, was abandoned after a considerable amount of diamond-drilling had been done. The plant was dismantled and the aerial tram removed.

At the *Waverly-Tangier* a small crew of men was employed. The winze from the 100-foot level of the *Tangier* is reported to have been unwatered, exposing a nice showing of silver-lead ore.

At the *Dunvegan*, on Bain creek, F. R. Rowley succeeded in winning a small tonnage of high-grade silver-lead ore, 7 tons of which was packed out to the Canadian Pacific Railway at Flat creek and shipped to Trail.

PLACER-MINING.

A company called the French Creek Development Company, Limited, was incorporated during the year for the purpose of raising sufficient capital to work the gravels of French creek, situated at approximately 70 miles north of Revelstoke. The plans of operation include the building of a new flume about 1¼ miles in length, penstock, etc., with the ultimate object of hydraulicking. L. N. Remillard, one of the directors, who has been interested in the placer deposits of French creek for many years, was in charge of a small crew of men engaged in carrying out the above work during the season. If the gravels are as rich and the yardage as great as estimated in the company prospectus there is no apparent reason why operations should not be successful.

W. J. Smith and George Mix, of Revelstoke, staked three placer leases on McCullough creek and succeeded in panning a little fairly coarse gold. As the results of their initial work are considered satisfactory, they intend to return as soon as weather conditions permit in the spring.

Wigwam Group. This property, consisting of a group of thirty-eight claims, is situated at a distance of 6½ miles by road from Wigwam Station on the Revelstoke–Arrowhead branch of the Canadian Pacific Railway. It is owned by J. Kirkpatrick and R. Armstrong, of Arrowhead, and was acquired under the terms of an agreement by the Wigwam Mining Company, of Tacoma; a number of additional claims were staked for the company. The president of the company is H. Brewitt, of Tacoma; W. T. Dumbleton is the engineer in charge of the work. The property has been described in previous Annual Reports, so will only be briefly dealt with.

The formation of the hillside on which mineralization was discovered consists of uniformly bedded quartzite and limestone. From recent observations the mineralization is apparently confined to the quartzites, which it has replaced, whether along a fractured zone cutting the formation or along a fissure conforming to the bedding-planes is obscure, from the results of the work so far accomplished.

However, on the assumption that the mineralized zone roughly conforms to the dip of the quartzites, work has been started to explore its possible continuation at the foot of the hill. Here two tunnels were being driven into the hillside in the direction of the strike of the formation and from the ends of which crosscutting was contemplated.

The strongest showing seen by the writer was situated at an elevation of 3,100 feet, or nearly 1,000 feet above the valley-floor, and far to the west of the present workings. Here a large open-cut exposes sparsely mineralized quartzite, the ore-minerals being finely crystalline zinc-blende and galena associated with pyrite. A tunnel driven from this open-cut for a distance of 15 feet in a direction of N. 30° W. did not prove any ore, but for the first few feet cut a mineralized and sheared quartzite, indicating the existence of a sheared zone having a south-westerly strike, which may have provided the channel for the mineral solutions. In any

event surface prospecting to prove this theory and to gain more knowledge of the character of the deposit appeared to be advisable at this point. The writer was informed that work was discontinued here on account of the lack of water for mining operations.

At the lower workings already referred to an underground stream was encountered in one of the tunnels at a short distance from the portal. This stream has cut its way through consolidated detritus, which forms the lower slope of the hill, and its water is now being harnessed to run a 2-drill compressor and a 15-kw. generator for lighting purposes. Other equipment includes a portable sawmill with which all the lumber for camp and mining requirements has been cut. The new camp recently erected consists of a bunk-house and cook-house for fourteen men and a manager's house and office.

During the summer months mining operations were handicapped by forest fires which were raging in the vicinity. About twelve men are employed.

LARDEAU MINING DIVISION.

Lead Star Group.

This group is owned by McIntosh Bros., of Cranbrook, and comprises six claims on the Stephney branch of Sable creek. The trail leaving the wagon-road at about 3 miles north of Camborne leads up a heavily timbered hillside to the summit of the ridge (elevation 5,900 feet); thence it is only a short distance down a very steep slope to the workings. The total length of the trail probably does not exceed 4 miles. When visited work of a prospecting nature was being done by Duncan McIntosh assisted by one man. The camp consisted of one small tent pitched within a short distance of the workings, at an elevation of 4,850 feet, or about 1,000 feet below the summit.

In the vicinity of the workings the country-rock consisted of steeply tilted grey schists. A strong showing of quartz which outcrops in the bank of a small ravine had been prospected by a short tunnel from a deep open-cut. The quartz, which was shattered and broken, had caved over the portal of the tunnel. In the bottom of the cut a small streak of ore occurred lying next to a heavy graphitic gouge. A small quantity of sulphide ore and oxidized ore had been dug out from near the surface. A sample of the oxidized ore taken from a pile of several hundred pounds assayed as follows: Gold, 0.37 oz.; silver, 9.8 oz. to the ton; copper, 7.19 per cent.; lead, 26.1 per cent.; zinc, 16 per cent. A sample of the sulphide ore which had not been subjected to oxidation assayed: Gold, 0.41 oz.; silver, 14.7 oz. to the ton; lead, 30.4 per cent.; copper, 2.65 per cent.; zinc, 28.1 per cent. The ore is a finely crystalline mixture of lead and zinc sulphides; to the naked eye no copper was visible.

To approach this showing from a more advantageous place another tunnel had been started a little lower down the hill. The direction of the vein was indefinite, as the surface was obscured by overburden, but the impression was gained that the mineralization occurred in a sheared fracture crossing the creek in an easterly and westerly direction, although the owner seemed to think it followed the ravine. However, the ore is of good grade and the showing well worthy of further development, which it is the intention of the owners to carry out next spring as soon as weather conditions permit.

Following up the creek to the summit, several old workings were visited, but nothing much could be seen on account of their caved condition; further work was contemplated at the uppermost, which is situated at a short distance from the summit.

Sunset.

This property, which is situated at the base of a high peak bearing the same name, was visited on the return trip from the *Lead Star*, the night being spent in the *Burniere* cabin. The old workings are situated at an elevation of 6,525 feet and at a distance of about 4 miles from the wagon-road. These workings, consisting of a tunnel and open-cut, were in a caved condition and there was nothing much to be seen. The mineralization, consisting of a mixture of galena, zinc-blende, and pyrite in a quartz gangue, apparently occurred in small cross-fractures, the continuity of which was indefinite. The country-rock appeared to be a rusty-weathering limy rock, the identity of which could not be determined in the field, but was thought to be a dolomite impregnated with iron sulphides which had become oxidized at the surface; locally it is referred to as a dyke-rock and some importance is attached to its occurrence.

Here, as at the *Burniere*, the quartz carries the dark-green stain, due to a mixture of hydromicas and referred to as mariposite by the Geological Survey. A sample of selected ore from a small quantity on the dump and from one of the stringers assayed: Gold, 0.03 oz.; silver,

38.9 oz. to the ton; lead, 12.2 per cent.; zinc, 2.1 per cent. Apparently it is a case where more surface prospecting might be done to advantage.

The *Burnicre* was visited, but as nothing of importance can be added to the report published in the Annual Report of 1914 no further report will be submitted.

Eclipse. This property is situated on Poole creek at an elevation of 3,000 feet and a distance of 2 miles from Camborne. The property was taken under option by Kay Alexander from J. E. Lindsley and associates, of Camborne, and a small crew of men was put to work during the season.

The vein outcrops strongly in the steep hillside at about 150 feet above the creek, striking up the hill in a direction of S. 17° E. and dipping at 70° to the east, cutting a schist formation. The outcrop, which has been explored by a deep open-cut, shows the vein-filling to be shattered near the surface. Oxidation has decomposed this loose ledge-matter, leaving small pockets of galena, quartz, and some "carbonates." A sample of the latter assayed: Gold, 0.3 oz.; silver, 6.3 oz. to the ton; lead, 7.1 per cent.; zinc, 0.7 per cent.

A sample taken of the clean galena from the open-cut, in order to get an idea of the probable silver ratio of the ore, assayed: Gold, 0.11 oz.; silver, 59.4 oz. to the ton; lead, 65.6 per cent.; zinc, 1.1 per cent. A sample from a pile of about 5 tons of sorted ore which had been extracted from near the surface assayed: Gold, 0.22 oz.; silver, 10.6 oz. to the ton; lead, 13.5 per cent.; zinc, 1.8 per cent.

Above the open-cut the surface is covered to a considerable depth with overburden and trenching was being undertaken to disclose the possible extension of the vein. Some years ago an adit-tunnel had been driven 25 feet below the outcrop and along the hanging-wall of the vein for a distance of over 200 feet. In this distance two crosscuts had been driven to the foot-wall, each showing a good width of vein. The farthest in, which is 204 feet from the portal, exposes the width of vein to be approximately 18 feet, over which the mineralization consists of sparsely disseminated lead, iron, and zinc sulphides in a quartz gangue. A sample taken across 17½ feet at this point gave the following returns: Gold, 0.20 oz.; silver, 3.6 oz. to the ton; lead, 1.7 per cent.; zinc, 2.7 per cent. Possibly better values could be obtained across a narrower width, but the character of the vein-filling would make selective mining unpractical. Past this crosscut the drift, which has been continued for 40 feet, swings to the west in order to pick up the continuation of the vein, folding or slight movements having displaced it in this locality. However, indications at the face appeared promising for picking it up in a short distance. The property is well situated for power-development and timber requirements.

Cholla Group. This property, comprising the following claims: *Cholla*, *Treadwell*, *Dora*, *Thelma*, and *L.V. Fraction*, is owned by the Imperial Development Syndicate, of Nelson. It is favourably situated on the lower slopes of Mount Lexington, covering an area which, extending downwards to Poole creek, adjoins the northerly boundary of the Camborne townsite. The situation is ideal for power, timber, and transportation requirements.

The Imperial Development Syndicate also controls the *Eva* group, which lies just to the north and at a slightly higher elevation. From this latter group a considerable tonnage of ore was mined and milled some years ago; these ore-bodies no doubt have been partly responsible for attracting attention to the potentialities of the *Cholla* group.

As far as can be ascertained, there is no striking difference between the geological conditions at the two properties. The formation, consisting of greenish-grey schists and phyllites, striking north-west and dipping almost vertically, is highly silicified, the siliceous solutions forming vein-like inclusions of quartz conforming to the schistosity and also filling well-defined cross-fractures. The cross-fractures are found to be more persistent and to carry better values than the other variety of quartz-fillings. The values are somewhat irregular in occurrence; the greatest concentration of ore-minerals has apparently taken place where there has been movement in the vein or at the intersection of other veins. On the *Cholla* group there are several cross-fissures and numerous quartz-outcrops.

Some years ago exploratory work undertaken was principally confined to a vein on the *Cholla* claim, where a series of shallow open-cuts exposed a cross-fracture having a width at the surface of about 3 feet of quartz with a north-easterly strike and almost perpendicular dip. To explore this vein a tunnel had been driven along it for about 40 feet, at which point a fault was encountered, and beyond this no serious attempt had been made to pick up the continuation

of the vein, but a 30-foot winze had been sunk where the best values were obtained. Encouraged by the results obtained from the winze, a tunnel had been driven to tap this ground at an additional depth of 98 feet, but was not completed. During the season the tunnel was advanced to a point vertically below the winze, making its total length 259 feet.

According to numerous samples taken by the owners, the vein-matter encountered in this tunnel carried values in gold and silver which indicate possibilities, but not enough work has been done to either prove or disprove the existence of ore in commercial quantities. There are other showings on the property which might be further prospected to advantage.

Teddy Glacier.* This property, situated at the head of the Middle fork of Sable creek, 13½ miles by road and trail from Camborne (estimated distance), was briefly described in the Annual Report for 1924 under the name *Ritchie* group. Since then the property has been acquired by the Teddy Glacier Mines, Limited, financed in Vancouver. The claims were originally staked some years ago by G. Ritchie and G. Edge following their discovery of large boulders of float-ore among the rocky debris on the slope below the glacier. In 1924 the glacier retreated considerably, due to the exceptionally dry summer, and the ore was discovered in place just below the shallow rim of the glacier at an elevation of about 7,500 feet (corrected aneroid reading).

The ore-showing previously described was of substantial dimensions, indicating a discovery of some importance. When the property was again visited this fall it was found that the ice had retreated still farther, adding considerably to the size of the surface showing, the stripping of which has so far been almost entirely the work of nature.

Unfortunately friction developed among the company's officers and the season, short at this altitude, was allowed to pass without anything much being accomplished. Late in the fall a trail some 4 miles in length (estimated) was built from the *Agnes* cabin to a natural camping-ground just below the claims, so that it is now possible to make the trip from Camborne to the property without hardship.

The formation of the area consists of altered sedimentary rocks, including phyllites, talcose schists, calc-schists, and limestones, with intercalated bands of green chloritic schist and rusty-weathering diabase-schist, both of which are considered to be of eruptive origin. On the *Teddy Glacier* property the ore occurs in altered and schistose limestone and calc-schist.

The ore consists of galena, with some associated zinc-blende, and pyrite in a quartz gangue, and occurs in a zone of fracturing in the calcareous rocks. The galena and pyrite occur in masses, bunches, and bands in the quartz, as well as disseminated through it, and the proportion of solid galena to quartz is exceptionally high. Some of the masses of solid galena are of considerable size, up to 6 by 4 feet. The galena varies in texture from the coarse crystalline to the "steel" grained variety. There is more or less pyrite associated with all the galena and the steel galena contains appreciable amounts of zinc-blende as well. Appreciable gold values seem to be associated with the pyrite and the galena seems to contain silver in the proportion of about half an ounce to the per cent. of lead.

There are two main fractures, the upper or more northerly one having a strike of N. 35° E. and the lower one a strike of N. 50° E., cutting the formation nearly at right angles. These two fractures, the more northerly one of which is a fault-fracture, can be seen cutting the bluffs to the north-east beyond the glacier and possibly 1,000 feet or more from the ore-showings. At their south-western extremities the fractures converge and come together to form the "big showing." Both fractures are filled with ore-bearing quartz, the upper one having a width of from 1 to 3 feet, while the other is from 3 to 5½ feet wide. Between these fractures the ground is covered with loose rock. Where the fractures come together they form an ore-body having a surface measurement of 22 by 40 feet. In this ore-body the solid sulphides, occurring in masses, bands, and bunches, predominate, while the remaining portions are composed of quartz well mineralized with disseminated sulphides. The upper and lower ore-filled fractures have been traced 64 and 78 feet respectively beyond the "big showing" and the mineralization appears to be going strong at their north-easterly extremities, which were covered with rock debris and shallow patches of ice. As there is a wide area of limestone to the north-east of these points and the fractures can be seen to continue beyond this limestone, possibilities are favourable for the continuation of the mineralization for some distance in this direction.

At the south-westerly end of the "big showing," covered for the most part with rock debris, the mineralization appears to terminate at or near a narrow acidic dyke which cuts diagonally

across the country-rock in an easterly and westerly direction. Ore is also found in stringers up to 2 feet in width conforming to the strike of the country-rock, and some of these occurrences are over 100 feet away from the main showing.

The following samples of ore were taken to get an idea of the values to be expected:—

Description.	Gold.	Silver.	Lead.	Zinc.
	Oz.	Oz.	Per Cent.	Per Cent.
Coarse crystalline galena taken from a number of places; a substantial amount of this ore could be sorted out	0.08	39.5	74.6	1.2
Steel-grained galena containing some pyrite and quartz, from various places; similar material occurs in quantity	0.04	23.3	53.1	10.3
Average sample across 5½ feet of ore and waste at the north-east extremity of the southern fracture 78 feet from the big showing	0.29	17.6	31.3	7.2
Fairly clean iron pyrites selected from various places; this material occurs in abundance	0.28	16.7	1.6	.....

With reference to the last sample, it should be said that the appreciable silver content was not expected and may be due to some local enrichment. Similar material assayed for the owners gave: Gold, 0.86 oz.; silver, 6.4 oz. to the ton; lead, 11.5 per cent.

In conclusion, it may be said that the showings are only very imperfectly exposed and that they indicate an important ore-body if the mineralization holds with depth. It is understood that next season a camp will be established near the showings and a start made on development-work, the results of which will be awaited with considerable interest.

Multiplex.—At the *Multiplex*, near Camborne, a few men were employed by O. T. Bibb during part of the season. The property is fully described in the Annual Report for 1924.

Big Showing. This property is situated on Goldsmith creek. Early in the season T. Boyter and G. Leask repaired the trail and subsequently did a small amount of development-work. The property is described in the Annual Reports for 1914 and 1919. In the latter it is referred to as having possibilities for a large tonnage of low-grade ore (silver-lead).

Alma, Paymaster, etc.—J. M. Humphrey and associates have acquired a series of claims covering limestone strata extending from Poole creek over the summit to Incomappleux river. The ore is silver-lead-zinc. In former years a small amount of superficial work was done on the claims.

Yellowjacket. J. E. Lindsley and J. A. Darragh while prospecting on the edge of the Camborne townsite found a quartz vein containing disseminated galena and chalcopyrite. Some claims were staked and work is to be done on the showings next season.

TROUT LAKE MINING DIVISION.

True Fissure. A small crew of men have been steadily employed during the year, work being confined to the *Bluebell* claim. According to recent reports the downward continuation of the ore was encountered in a raise from the lower level and also in a crosscut, in which latter it is claimed there is a width of 6 feet having average values of: Gold, 0.10 oz.; silver, 6.7 oz. to the ton; lead, 6.6 per cent.; zinc, 5.5 per cent. W. T. Dumbleton is the engineer in charge.

Cromwell. Towards the end of the year Colonel H. H. Armstead, who recently obtained Crown grants on the eight claims of this group, gave a contract to A. P. Garrett for the continuation of the long crosscut tunnel commenced in 1923. The property, which is situated on the North fork of Brown creek, is mentioned in the Annual Report for 1914.

Ophir-Lade. This gold-quartz property, described in the Annual Report for 1922, is situated on the summit of the divide between Gainer and Porcupine creeks. The owners are the Goldenville Mines, Limited, financed in Vancouver. A small crew was employed during the season and a portable stamp-mill and oil-engine installed. A new trail was also built up Bunker Hill creek. F. W. Welch, of Vancouver, was in charge.

Mohican. This silver-lead property, described in the Annual Report for 1914, was reopened last summer after a long period of inactivity. The Mohican Mining Company, organized in Vancouver, acquired the claims last June. C. Copp, in charge of a crew of about seven men, continued development-work all winter. After preliminary work consisting of repairs to the trail and erection of new buildings, etc., the old tunnel was cleaned out preparatory to driving it a further 450 feet to cut the downward extension of the ore-shoot developed in the upper tunnel. Good progress is reported to have been made in driving this tunnel,

Surprise. This property, described in the Annual Report for 1924, is situated on Surprise creek, 7 miles from Ferguson. Dave Morgan is the owner. During the fall the possibilities of the *Surprise* as a big low-grade silver-lead proposition were being investigated. Trenching was done along the outcrop of the vein, followed by extensive sampling, the work being done under the supervision of Harold Lakes, representing the Victoria Syndicate.

Mollie Mac.* This property, owned by the Pete Cameron Estate, is situated on Gainer creek on the supposed extension of the *Surprise* vein, which, it is understood, can be traced over the summit. During the summer C. O. Woodrow secured an option and interested San Francisco mining men, who employed some men in trenching and sampling the vein with a view to investigating its possibilities for a large tonnage of silver-lead ore of milling grade. A short length of trail connects the mine cabin with the Gainer Creek trail at a point 3 miles from 10-Mile. A small amount of surface work has been done consisting of trenches and open-cuts, but in many places the bare rocks are exposed.

The ore consists of disseminated galena and pyrite occurring as replacement deposits in limestone strata which strike north-westerly up the steep, almost precipitous, mountain-side. The mineralization occurs in bands, from 3 to 5 feet wide in the area examined, sometimes widely separated. Some thousand feet of outcrop at the lower end of the property was examined, but there are, it is said, other showings farther up the mountain. Physical conditions are exceptionally favourable for cheap development.

OTHER PROPERTIES.

Ben Hicks, of Gerrard, has acquired the *Golden Crown* claim on the Middle fork of Stobart creek and is reported to have cleaned out the trail preparatory to doing some work. The property is described in the Annual Report for 1914.

W. White and George McLaren are reported to have done some work on the *I.X.L. Fraction*, which is staked on the westerly extension of the *Nettie L.* near Ferguson. The property is described in the Annual Report for 1924.

Mrs. Jowett, who has been actively interested in mining in the Trout Lake area for many years, spent some strenuous weeks prospecting her claims on the south-west slope of Silver Cup mountain. Some of these claims are described in the Annual Report for 1918. During her last trip she is reported to have found a nice showing on the *Hercules* claim.

Near Gerrard, J. Parisian and associates have done some work on the *Silver Tray* group, situated on the Trout Lake slope below Bonanza basin.

Between Gerrard and Poplar no new developments are reported, activities being chiefly confined to doing assessment-work, prospecting, and examinations by scouting engineers.



Consolidated Mining and Smelting Co. of Canada- Copper Rod-mill at Trail.



Consolidated Mining and Smelting Co. of Canada- Eight Tons of Silver for Shipment.

WESTERN MINERAL SURVEY DISTRICT (No. 6).

BY WM. M. BREWER, RESIDENT MINING ENGINEER.

INTRODUCTORY.

The Western Mineral Survey District (No. 6) includes the following seven Mining Divisions: Alberni, Clayoquot, Quatsino, Nanaimo, and Victoria (embracing the whole of Vancouver island), and Vancouver, New Westminster, and a portion of Nanaimo, on the Mainland. The area within the boundaries of the district is approximately 248 miles from north to south by 213 miles from east to west, including the area covered by water between the Mainland and Vancouver island.

The writer wishes to extend to the several members of the Geological Survey of Canada, mine managers, prospectors, and to all others engaged in the mining industry with whom he has had business during the past year his sincere thanks and appreciation for the many courtesies that have been extended to him.

In 1925 field-work was started on Vancouver island on March 7th and was practically continuously carried on in making examinations of mines, prospective mines, and newly staked prospects until November, 1925. Owing chiefly to the heavy fogs on the Coast and rainfall some field-work had to be postponed until February, 1926, when it was finished and results included in this report. The following sections in District No. 6 were visited and examinations made during 1925:—

Alberni Mining Division: West coast of Vancouver island—Alberni canal and Taylor River sections.

Clayoquot Mining Division: West coast of Vancouver island—Clayoquot sound, Nootka sound, Tasis canal, Esperanza inlet, Muchalat arm, Kennedy lake and river.

Quatsino Mining Division: West coast of Vancouver island—Elk lake, South-east arm of Quatsino sound, and Holberg, head of South-west arm of Quatsino sound.

Nanaimo Mining Division: East coast of Vancouver island—Courtenay, Comox, Campbell river, Hardy, Shusharti, and Alert bays.

Nanaimo Mining Division: Mainland—The mountains easterly from Malaspina strait near Lund, Powell lake, Phillips and Frederick arms of Cordero channel.

Nanaimo Mining Division: Islands—Texada, Lasqueti, Thurlow, and Quadra islands.

Vancouver Mining Division: Mainland—The mountains adjacent to Jervis inlet, Hotham sound, Seechelt inlet, Salmon arm, Pacific Great Eastern Railway section, upper Squamish and Mamquam rivers, and the mountains adjacent to Howe sound.

New Westminster Mining Division: Mainland—Pitt lake, Chilliwack and section easterly from there, and Ruby creek.

Victoria Mining Division: Vancouver island—Sooke River section; Mounts Skirt, Sicker, and Brenton; Koksilah river; Sooke lake and Leech rivers; also several points in the vicinity of Victoria.

PROGRESS OF METALLIFEROUS MINING.

The metalliferous- or lode-mining industry in District No. 6 has shown considerable progress during 1925 as compared with the previous year, as well as a greater production despite the low price of copper. In addition to the production of the Britannia Mining and Smelting Company, Limited, which has been the only regular producer on a commercial scale in the district, there have been a few small shipments of ore from the *Doratha Morton* and *Monte Christo* properties made for experimental purposes.

The Britannia Company has increased its production as compared with that of 1924 by over 4,000,000 lb. of copper, 4,000 oz. of gold, and 44,000 oz. of silver. The mine and mill have been operated practically to capacity during the entire year. The daily normal capacity of the mill is 2,500 tons of dry ore, but if necessary it can be increased to 3,000 tons. The production during 1925 has been the greatest in the history of the *Britannia* mine; detailed information with regard to the operations of the company will be found under the heading of the "Vancouver Mining Division" later in this report.

Progress in the industry is better shown by the development-work that has been done on a number of properties in the district, such as the *Old Sport* mine, operated by the Coast Copper

Company at Elk lake, Quatsino Division; the *Alice Lake* group in the Quatsino Division; the *Star of the West* group, Tasis canal, Nootka sound, Clayoquot Division; the *Sunloch* group, Jordan river, about 40 miles from Victoria; the *Gem* (formerly *Nutcracker*) on Texada island; *Doratha Morton, Alexandria, Enid, Julie,* and *Monte Christo* groups, Fanny bay, Phillips arm of Cordero channel; the *Florence, John Bull,* and *Royal Arch* groups on the shore of Malaspina strait, about midway between Powell river and Lund; the *Silver Chief* group on Dolly Varden creek, southerly end of Chilliwack lake, and at Pitt lake, New Westminster Division; the *Goat Creek* group on the southerly side of the Mamquam river, about 8 miles easterly from Squamish; the *Golden King* group on Ashloo creek, a tributary of the upper Squamish river; the *Brandywine* and *Blue Jack* groups on the Brandywine river.

Two of the above-mentioned properties—namely, the *Old Sport* and *Sunloch*—have already been developed into mines with quite extensive tonnages of "actual ore" and will without doubt be producers in the near future. The development-work on each is described under the proper headings later in this report.

In addition to the development that has just been mentioned, there has also been more intensive prospecting on several of the Crown-granted and un-Crown-granted mineral claims than has been the case for some years past.

There have also been some new discoveries of deposits of metalliferous minerals, such as near the mouth of Klinaklini river at the head of Knight inlet; also on the main Goat creek, tributary of the Mamquam river near Squamish; and considerable prospecting has been done in the country tributary to the upper Squamish river, as well as in the mountains adjacent to Jervis inlet, and the westerly side of Howe sound. From the foregoing it can be seen that the condition of the metalliferous-mining industry has improved considerably during the past year.

Several mining engineers representing some of the large operators in the United Kingdom, Ontario, Quebec, and the United States, as well as some representing local capital, have made examinations of many properties in the district. The results of these examinations have not been generally made public, yet there have been some cases where negotiations have been started which promise to be consummated during the season 1926. Such a case, for instance, as the *Lucky Four* group on the summit of the Cheam range, easterly from Chilliwack, on which property it is reliably reported that the Anaconda Mining and Smelting Company, of Montana, has secured an option and it is expected will carry on development-work as early in 1926 as is practicable.

COAL-MINING.

No mention is made relative to coal-mining in the following report, because full reports on that industry are made by the Coal-mine Inspectors, appearing in this Annual Report under the proper heading.

BIBLIOGRAPHY.

The bibliography pertaining to the Western District (No. 6) has been increased during 1925 by the publication of the following reports:—

Annual Report of the Minister of Mines, B.C., for 1924.

Annual Report of the Resident Engineer for 1924, published as a pamphlet.

"Summary of Mining Operations for the Eight Months' Period, January 1st to August 31st, 1925, in the Province of British Columbia," published as a pamphlet compiled by John D. Galloway, Provincial Mineralogist.

Summary Report, 1924, Canada Department of Mines, Geological Survey Branch, "Chilko Lake and Vicinity," by V. Dolmage.

Same report, "The Genesis of the Texada Island Magnetite Deposits," by C. O. Swanson.

PROSPECTING.

During the past year the British Columbia Chamber of Mines of Vancouver and the Vancouver Island Prospectors' Association of Victoria have been showing a very decided interest in promoting the education of prospectors in the fundamentals of geology, mineralogy, and assaying, and consequently there has been an increased number of prospectors in the field during the past summer.

In the No. 6 District there are several representatives of the "old-time prospector," men who have devoted several years to intensive prospecting in one section and who live practically

all the time either on their mining claims or in the neighbourhood. During 1925 there has been a noticeable improvement in the condition of several mineral claims owned by such prospectors owing to the extension of the work done on the claims, which has been generally far in excess of the amount of work required for annual assessment.

In this connection it is gratifying to note that during 1925 some of these old-time prospectors have been successful in bonding or optioning their properties on which they have been working steadily for several years past. One incentive for the performance of extra work has been the increased demand for mineral claims on which deposits of silver-lead-zinc ore occur.

NON-METALLIC MINERALS AND BUILDING-STONE.

The non-metallic minerals found in the Western District include gypsum, talc, bauxite of low grade (used in refining gas), potter's clay, fireclay, shale (used in making sewer-pipe, paving, and pressed brick), common brick-clay, natro-alunite, and limestone (used for the manufacture of sulphite in the pulp and paper mills, also in the copper-smelters for flux, and exported in barrels as calcined lime).

Building-stone occurs at several points, the varieties being marble, granite, sandstone, and andesite, which are, with the exception of marble, quarried on a commercial scale. The most extensive granite-quarries at present being operated are on Nelson and Granite islands, Jervis inlet, about 50 miles north-westerly from the city of Vancouver. Sandstone of excellent quality for building occurs on Newcastle island near Nanaimo, where a large quarry has been opened. Andesitic tuff, used in the erection of the Parliament Buildings and other important buildings, is quarried on Haddington island, 4 miles west of Alert Bay.

CRUSHED ROCK AND GRAVEL.

The most extensive quarries from which crushed rock and gravel are obtained are on the east side of Howe sound on the Mainland, and near Albert head at the entrance to Esquimalt harbour near Victoria.

PORTLAND CEMENT.

No. 6 District contains the only cement plants in the Province. On Saanich inlet near Victoria the British Columbia Cement Company owns two plants—one at Bamberton on the west side and the other on Tod inlet, an arm on the east side. The operations of this company will be further referred to under the heading of the "Victoria Mining Division."

LABOUR CONDITIONS.

It is gratifying to be able to state that during 1925 labour conditions in the metal-mining industry have been mutually satisfactory to the operators and the employees and the relationship between capital and labour has been quite harmonious.

IRON AND STEEL.

During 1925 there have been no new developments regarding the iron and steel industry in the No. 6 District. No requisition has been made during 1925 for supplies of iron ore for experimental purposes under the provisions of the "Iron-ore Supply Act."

ESQUIMALT & NANAIMO RAILWAY COMPANY'S LAND.

The fact that practically one-third of Vancouver island is comprised within the boundaries of the land-grant to the Esquimalt & Nanaimo Railway Company in consideration of the building of that line from Esquimalt to Wellington, paralleling the east coast of Vancouver island, has been frequently referred to in former reports as acting as a strong influence against prospecting within its boundaries, for the reason that all base minerals such as copper, zinc, and lead occurring on the land-grant are owned by the railway company, while the precious metals only belong to the Crown.

As the regulations with regard to minerals occurring on the grant may have been misunderstood, it is deemed only fair to the company that the following regulations which are in force to-day with regard to minerals found on the company's lands should be made public in this report, as well as the fact that the entire land-grant is open to prospectors subject though to the following regulations:—

"*Regulations.*

"Mineral lands, which include all lands supposed to contain minerals other than or in addition to coal and coal-oil. These lands will be leased or dealt with under option. Locators of mineral claims on the unsold portions of the land-grant may, on payment of $50 per claim, obtain an option for one year to purchase the surface rights and timber at the price of $5 per acre for the surface and $1 per 1,000 for all timber in excess of 8,000 feet B.M. per acre. Minerals to be worked on royalty as specified in regulation below. The company does not, however, bind itself to grant options on, or sell, either the surface or timber of any land which it may decide is required for its own use or otherwise. Holders of options who intend to purchase must survey the land and file their field-notes at the company's land office at Victoria within the period of their option.

"Mineral lands will be leased at an annual rental or sold. The following royalties being reserved on the ores mined upon the property:—

"(*a.*) Upon iron ore (and this is to be understood as material containing over 40 per cent. metallic iron and manganese), 1 cent per unit of iron plus manganese on total contents; that is to say, should the ore contain 50 per cent. iron and manganese the royalty per ton would be 50 cents. A minimum royalty of 25 cents per ton.

"(*b.*) One-tenth of 1 cent per pound upon the lead contents of lead ore.

"(*c.*) One-twentieth of 1 cent per pound upon the zinc contents for the first forty units; one-tenth of 1 cent per pound upon the zinc contents in excess of forty units.

"(*d.*) One-tenth of 1 cent per pound upon copper contents up to and including 2 per cent. of copper contents; upon the first 1 per cent. in excess of 2 per cent. of copper contents, fifteen one-hundredths of 1 cent per pound; upon the first 1 per cent. in excess of 3 per cent. of copper contents, one-fifth of 1 cent per pound of copper contents; upon the first 1 per cent. in excess of 4 per cent. of copper contents, one-quarter of 1 cent per pound of copper contents; upon any copper contents exceeding 5 per cent. copper contents, three-tenths of 1 cent per pound upon such excess.

"(*e.*) A royalty of 2 per cent. of the gross value of ores or concentrates not otherwise specified."

The Mining Divisions on Vancouver island, portions of which are embraced within the boundaries of the land-grant, are as follows: Victoria, Alberni, and Nanaimo.

ROADS AND TRAILS.

During 1925 assistance has been rendered in the No. 6 Mineral Survey District for the construction of many roads and trails under the provisions of the "Mines Development Act."

LIST OF SHIPPING-MINES IN NO. 6 MINERAL SURVEY DISTRICT, 1925.

Mine.	Locality.	Tons.	Character of Ore.
Britannia	Britannia	994,113	Copper, gold, silver.
Doratha Morton	Phillips arm	68	Copper, silver.
Total		994,181	

ALBERNI MINING DIVISION.

In the Alberni Division there has been but little activity during the past year, either in mining or the staking of new discoveries by prospectors.

The number of claims in good standing in the Division was about the same at the end of 1925 as at the end of 1924, but the status of several of them was changed from un-Crown-granted to Crown-granted. Further development on some of these claims is warranted. There are some properties, such as the *Morning* group on Taylor river, near the head of Sproat lake, on which ore occurs carrying considerable proportions of its value in gold and silver, and it is on such mineral claims that most of the work in the Alberni Division has been done during the past year.

There has been noticeable inactivity along the Alberni canal; in fact, about the only work that has been done except annual assessment-work has been by Charles Lewis on the *Dauntless* group, nearly opposite to Port Alberni.

This group was described in detail in the Annual Report for 1919, and although considerable work has been done since then, there has not been any very material change in the general conditions; for that reason it is deemed unnecessary to repeat the description.

Most of the claims in the Alberni Division are situated very advantageously from a transportation point of view, usually within a few hundred feet of deep-water transportation.

For the past several years there has been a lack of interest shown by mining men generally toward the prospects in this Division, which is to quite an extent accountable for because of the fact that on mineral claims from which ore was shipped from twenty to twenty-five years ago work was suspended, usually because there was not sufficient tonnage in sight of ore of shipping grade, and has never been resumed.

The deposits of ore were lenticular in structure, and after the lenses that were exposed as outcroppings were mined out the properties were generally abandoned before being thoroughly prospected.

This practice gave the whole Mining Division a "black eye," from which it has never recovered, and during recent years the copper market has not been such as to make the reopening of old mines or indeed the development of new prospects sufficiently attractive to capital as a form of investment.

CLAYOQUOT MINING DIVISION.

Similar remarks to those made with reference to the Alberni Division would be justified when the condition of the metal-mining industry is considered in the Clayoquot Division. But there are two sections at least in the latter Division that have attracted some attention during the past year. These are in the neighbourhood of Tasis canal, an arm of Nootka sound, and Kennedy river above the head of Kennedy lake. These two sections have received attention from a few old-time prospectors, who practically live on their mineral claims and devote most of their time to extending the development-work and thereby showing the faith they have in their own prospects.

The Kennedy Lake and River sections are particularly noted because of the occurrences of fissure quartz veins which carry gold values, sometimes as high as $50 to the ton. As most of the ore in these veins is free-milling, an opportunity is presented for individual miners who understand both mining and amalgamation, are willing to do hard work themselves, and are backed by reasonable capital to carry on operations on a limited scale that should result in returning satisfactory results. Most of these veins, however, are too small and the gold values too irregular to be attractive for company operation with considerable overhead expense.

Eldorado. Systematic prospecting on this group of eight claims on the Zeballos river, at the head of Zeballos arm of Esperanza inlet, was done during last summer, but with disappointing results. The ore which had yielded such spectacular values in gold proved to be so limited in extent that the British syndicate, which had acquired a 51-per-cent. interest in the claims when they were first staked, abandoned them.

Star of the West. This group contains the *Hakadato*, *Wolverine*, and *Star of the West* claims and is situated on the westerly side at the head of Tasis canal. The property is owned by William Poole and T. T. Gardhouse, of Nootka. The *Star of the West* is about 1,600 feet from the shore of the canal. The space between the shore and the claim was first staked in 1923 as the *Tahsis* and later restaked as the *Jessie R.*, mainly in order to afford a water-front to the *Star of the West* group. The head of Tasis canal is about 4 miles northerly from Tasis narrows, which connects the canal with Esperanza inlet and the open Pacific ocean.

In the Annual Report for 1923 this group was quite fully described, but another examination was made on May 8th, 1925, for the reason that Mr. Poole had extended the development and prospecting work considerably since the previous examination. Most of this work has been done on the *Hakadato*, which is the farthest claim westerly of the group, being about 6,000 feet distant from the shore-line of Tasis canal and at an elevation of 1,500 feet above sea-level.

The *Maggie Mac*, a new location adjoining the *Star of the West*, has mineral-outcroppings, the strike of which is north-west, indicating that there is a connection between them and the mineral-zone that outcropped and had been prospected on the *Star of the West* and *Hakadato* claims. Up to the present time no prospecting-work has been done on the *Wolverine*, but the general indications, however, are that the mineral occurs in a belt extending through the entire

group and consists of limestone, garnet rock, and epidote, which belt is bounded on both the north-east and south-west by granodiorite, with its line of strike north-westerly. The width of the mineral-bearing zone on the *Hakadato* is possibly nearly 200 feet, with a proven length of about 200 feet, but undetermined beyond, because on the other claims there has not yet been sufficient prospecting done to determine any dimensions.

The mineralization, which is associated with limestone, garnet and epidote rocks, consists of chalcopyrite, some arsenopyrite, pyrite, pyrrhotite, occasional crystals of galena, and zinc-blende, with occasional bunches of bornite. Judging from the assays made from samples, it appears that the arsenopyrite carries the gold values, but that the chalcopyrite and pyrite generally only carry copper, while the zinc-blende ore appears to occur irregularly in the mineral-zone, and that the galena carries some silver but not enough lead to be considered as important. An assay made from a general sample taken in 1923 from the prospect-hole on the *Star of the West* yielded: Gold, 0.24 oz.; silver, 1 oz. to the ton; copper, 9 per cent.; zinc, 14 per cent. Another general sample taken from the face of an open-cut on the *Hakadato* at the same time assayed: Gold, 0.16 oz.; silver, 1.5 oz. to the ton; copper, 16 per cent.; zinc, *nil.* A third general sample also taken from the *Hakadato* assayed: Gold, 0.4 oz.; silver, 0.8 oz. to the ton; copper, 7.5 per cent.

Samples taken during the examination in May last from the *Hakadato* workings, which will be described later, assayed as follows:—

Sample No. 1, average across 4 feet: Gold, trace; silver, 1 oz. to the ton; copper, 3.7 per cent.; zinc, 1 per cent.

Sample No. 2, from sorted ore on the dump from the same open-cut as No. 1 was taken, assayed: Gold, 0.10 oz.; silver, 1 oz. to the ton; copper, 12 per cent.; zinc, 1 per cent.

Sample No. 3, average from hole resulting from a shot fired in the floor of the same open-cut, assayed: Gold, 0.10 oz.; silver, 1 oz. to the ton; copper, 6.9 per cent.; zinc, 1 per cent.

Sample No. 4, a general sample from prospect-hole about 150 feet south-easterly from the main workings on the *Hakadato*, assayed: Gold, trace; silver, trace; copper, 4 per cent.; zinc, 3 per cent.

At a point about 400 feet westerly from the east line of the *Hakadato*, at the head of a gulch, there are extensive outcroppings made up of chalcopyrite associated with garnet, epidote, and limestone, close to the contact with granodiorite. At this point the development-work done is near the base of a cliff and consists of an open crosscut 30 feet long driven through an ore-zone on two levels or benches. The cut is 5 feet wide, 12 feet high at the first face or bench, 23 feet from the entrance, and 15 feet higher at the face on the upper bench in a southerly direction, where the crosscut has been continued 16 feet. About 12 feet wide on the upper bench is through ore with which is mixed garnet rock, epidote, and limestone similar to the outcropping, but the remaining 4 feet of the 16 feet is through solid ore, chalcopyrite predominating. This open-cut is driven across the strike of the outcrop to this point where granodiorite occurs, apparently forming the south-westerly wall of the mineral-bearing zone. A drift open-cut has been made 20 feet long in ore about 5 feet wide along the strike of the granodiorite wall in a north-westerly direction, also a short drift about 10 feet long in ore towards the south-east. This open-cut work has exposed mineralization for a total width of 39 feet long and a length of about 30 feet.

At a point about 50 feet north-westerly from the open-cut work described there is an outcropping of ore next to the granodiorite on which a prospect-hole has been sunk, but the space between the main open-cutting and this prospect-hole is covered with a very heavy overburden of slide-rock from a high ridge of granodiorite about 200 feet southerly from the workings, and consequently has not been prospected. Another outcrop of ore occurs about 100 feet south-easterly from the main open-cutting.

Other work consists of trenching and open-cutting on the opposite boundary of the mineral-zone, about 175 feet distant. This has been done on the face of another steep bluff at the head of Ubedam creek, which forms a deep gulch with precipitous walls, and also at some points in the space between. This work has exposed solid ore at the point about 175 feet northerly from the first-mentioned open-cutting; also a prominent outcrop of ore occurs in an open-cut approach 18 feet long to a short adit driven into the side of the bluff, with the face of the cut about 20 feet high. In this work there is exposed a width of 5 feet of ore separated into two sections by an intrusive dyke striking northerly and dipping nearly vertical. The dyke is about 18 inches wide at this point, but towards the south it occurs in two sections, each being about 18 inches wide. One of these sections pinches out a few feet southerly from the open-cut and appears to

be replaced with ore, but the other branch of the dyke, the one that is exposed in the face of the open-cut, maintains continuity for a distance of about 60 feet to a point near the blacksmith-shop close to the discovery post of the *Hakadato* and 100 feet across from the main open-cut work already referred to.

The rock exposed between the main open-cut work first described and the last mentioned is made up of garnet, epidote, and limestone, and in some places where trenching has been done there is evidence of quite heavy mineralization.

The chief reason why but little underground work has been done on this property is because of the difficulty of obtaining dynamite, which is not carried on the regular Coast steamer, the "Princess Maquinna," and the only means of securing any explosives in any of the camps on the west coast is by getting it shipped on fishing-boats or launches.

All of the work described is done in a precipitous mountainous area at the head of a torrential stream locally known as Ubedam creek, which flows into the head of Tasis canal about a mile westerly from the mouth of the Tasis river.

The banks of Ubedam creek are very precipitous and about 100 feet high; consequently they are quite difficult to prospect, but Poole has found outcroppings of copper ore in some places in the bed and bank of the creek. Apparently in places it flows along the line of strike of the mineral-zone, the rock having been eroded out to the depth mentioned.

Transportation facilities for the *Star of the West* are excellent, because the group extends from deep water on Tasis canal and is located one claim wide for a distance of 6,000 feet, the *Hakadato* being the farthest from the sea, the workings thereon being at an elevation of 1,500 feet above the sea.

On Muchalat arm of Nootka sound and on Gold river, which empties into that arm, prospectors were working during 1925 and a few claims were staked, but only a limited amount of prospecting-work was done, which was insufficient to determine many material facts relative to the discoveries. In the Nootka Sound section there is a very extensive and unexplored territory at the headwaters of the East and West forks of Gold river around Muchalat lake and the headwaters of Elk river, which flows north-easterly into Upper Campbell lake, near the centre of Vancouver island, and the north-westerly boundary of Strathcona Park.

In the same mountainous section is the source of the Nimpkish river, which flows north-westerly into Nimpkish lake and from there into Johnstone strait on the east coast of Vancouver island. This section is occupied by the most precipitous range of mountains on Vancouver island, in which occur peaks reaching an elevation of about 8,000 feet.

A few old-time prospectors have penetrated these mountains in search of mineral-deposits, but so far as is known none have crossed Vancouver island, either by following up Gold river and down Elk river or by following up Gold river to the summit and down Nimpkish river.

W. Poole has done more prospecting in the Nootka Sound section during the past fifteen or eighteen years than any other man, but so far has failed to discover any occurrences of mineral, except the *Star of the West* group, that he considered worth while recording when the difficulties of overcoming the handicap of lack of transportation facilities were considered. But one man's efforts in such an enormous unexplored area are futile unless a discovery is made by accident. The only method for prospecting this area would be by travelling up Gold river to the summit and down Elk river or the Nimpkish. By adopting such a course the prospector would be crossing the geologic formations in that portion of the island practically at right angles to the strike of the rocks, except down the headwaters of the Nimpkish river, which for several miles flows parallel to the general strike of the formation.

KENNEDY LAKE SECTION.

There has been considerable prospecting in the mountains adjacent to the Kennedy (Elk) river during 1925, where some of the old claims were further prospected and work recorded by William Spittal, an old-time prospector, for himself and associates. On these claims there occur gold-bearing quartz veins typical of that section of Vancouver island, but as only the annual assessment-work has been done, and that only for a few years past, this is hardly sufficient to determine any material data as to the future possibilities of the prospects. The veins generally are narrow, sometimes, though, reaching a width of from 2 to 3 feet and carrying more than $10 in gold to the ton, as is the case on the *Rose* group (formerly the *Rose Marie*), described in

the Annual Reports for 1899, 1913, and 1916, work on which was suspended in 1900 by the owners, the Rose Marie Mines, Limited, a British syndicate heavily interested in South African mines. Later, after a rock and snow slide destroyed the concentrating-mill, compressor plant, and other machinery, the property was allowed to go to tax sale and acquired by Clarence Dawley, of Clayoquot, and Anthony Watson, of Port Alberni, who are not financially able to install new machinery, so keep the taxes paid up in the hope of selling. It is mentioned in this report because it appears to be such a property as a man with some capital and thorough knowledge of mining and milling methods could operate on a paying basis.

TOFINO INLET SECTION.

White. William N. Walton, who is associated with D. McMillan, of Victoria, has continued some further prospecting-work on the *White* group, about 1½ miles up Tofino (Deer) creek from the head of Tofino inlet and about 800 feet elevation. This property was quite fully described in the Annual Reports for 1919 and 1921. The work done recently has confirmed the theory expressed when the group was staked that the source of the high-grade copper-ore outcroppings, which cover about an acre or more on a bench or terrace on the mountain-side where work has been done, would be found by systematically prospecting a wide shear-zone that occurs in the country-rock, which Mr. Walton is doing.

Owing to the low price of copper none of the prospects on the west coast of Vancouver island has been attractive to capitalists for the past few years, but there are several other mineral claims in this and other sections of the Clayoquot Division on which the showings are so good as to indicate potential values as working-mines after a reasonable amount of capital has been expended on further development-work.

No matter how industriously a prospector may work on his annual assessments, he cannot make much showing unless he is possessed of a few thousand dollars of capital; therefore as conditions are not materially changed it is deemed unnecessary to repeat descriptions of such work from year to year.

HESQUIAT LAKE SECTION.

Hesquoit. Owing to the zinc content in some ore found near the southerly shore of Hesquiat lake this section has been receiving attention from prospectors during 1925, resulting in staking and recording the *Hesquoit No. 1*, *Hesquoit No. 2*, *Hesquoit No. 3*, and *Hesquoit No. 4* claims, known as the *Hesquoit* group, by A. L. Smith, of Alberni, and associates.

These claims cover a portion of practically the same ground as the old *Brown Jug* group, described in the Annual Report for 1916. It may be interesting to refer to the assays of the samples taken at that examination, which were as follows:—

A sample taken from a small dump at the portal of an adit assayed: Gold, 0.08 oz.; silver, 1.6 oz. to the ton; copper, 1 per cent.; zinc, 10.4 per cent.

A sample taken across 5 feet near the face of an open-cut 21 feet long assayed: Gold, 0.12 oz.; silver, 5.4 oz. to the ton; copper, 1.7 per cent.; zinc, 6 per cent.

A selected sample taken from the dump at the same open-cut assayed: Gold, 0.62 oz.; silver, 8 oz. to the ton; copper, 3.5 per cent.; zinc, 12 per cent.

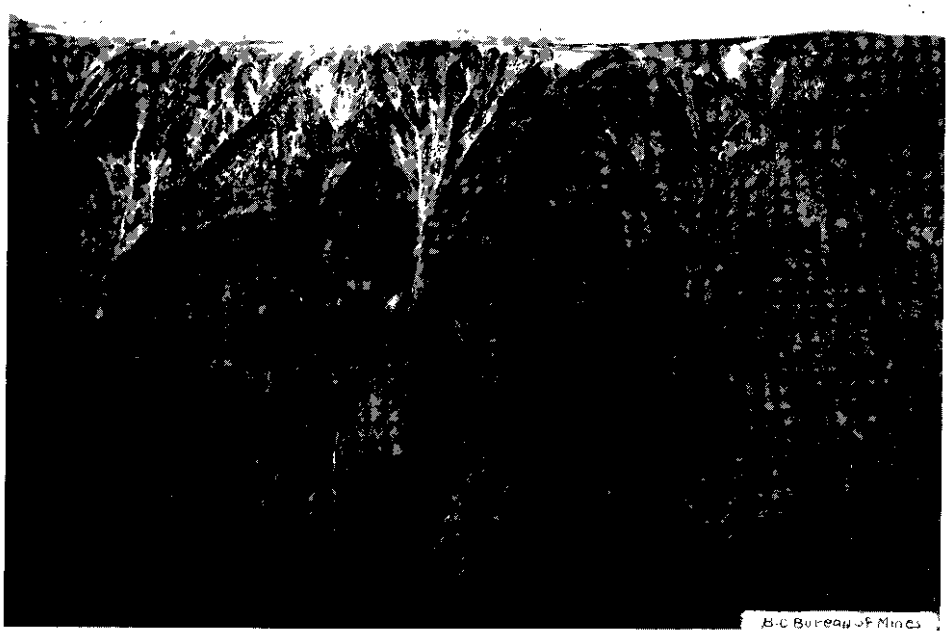
The presence of zinc in the ore was a great handicap when the old claims were held, and that, added to poor transportation facilities, was mainly responsible for the abandonment of the *Brown Jug* group after considerable prospecting had been done. Under present conditions with regard to zinc and the perfection of the oil-flotation method of concentration, it may prove to be worth while to further prospect systematically these ore-deposits, as the transportation of concentrates could be done with much less difficulty and expense than transporting ore.

SIDNEY INLET SECTION.

Indian Chief. In the Annual Reports for 1917, 1918, 1920, 1922, and 1923 this group of claims, owned and operated by the Tidewater Copper Company, was very fully described. There has been no resumption of operations at the property since they were suspended in the late fall of 1923, but during 1925 the assets of the company were sold and bought in by the debenture-holders. What the future plans of the purchasers are has not been made public, but it is hoped that operations will be resumed at an early date.



Doratha Morton Camp, Nanaimo M.D.



Near the Head of Klinaklini River.

QUATSINO MINING DIVISION.

Although there has not been any production from any of the mineral claims in the Quatsino Division during 1925, there has been considerable interest shown in prospecting in some parts of the Division, especially in the vicinity of Alice and Victoria lakes, on Kyuquot river at the head of Kyuquot arm, Kyuquot sound, and in Easy cove in the same arm.

Several new locations were staked and recorded in each one of these sections during 1925 and assessment-work was done on many claims. At the end of the year there were seventy-one un-Crown-granted claims in good standing in the Division, fifteen of which were located during 1925.

While this showing may not be considered with much enthusiasm, yet it is an improvement over recent years, and the work that has been done during 1925 promises to result in the development of some producing mines in the near future.

The most important work done in the Division during 1925 is the continuous development of the *Old Sport* mine and the systematic prospecting of the *Alice Lake* group, as well as further development of the *Millington* group near the mouth of Spruce river at the head of the West arm of Quatsino sound.

Old Sport.

In the Annual Report for 1924 the property known as the *Old Sport* mine, operated by the Coast Copper Company, a subsidiary of the Consolidated Mining and Smelting Company of Canada, Limited, was described in detail; therefore it is unnecessary in this report to do more than refer to the development that has been carried on during the past year.

The development-work during 1925 has consisted of a total footage of 2,789 feet, which includes drifting, crosscutting, and raising. The total diamond-drilling footage during 1925 in the mine and on the surface was 4,526.8 feet, of which footage 599 feet was on the surface. The total footage of development-work on the *Old Sport* mine from the commencement to the end of 1925 is in excess of 10,000 feet, including crosscut adits, drifts, winzes, and raises, but exclusive of the extensive prospecting-work that was done previous to 1916. Diamond-drilling totalling 1,423 feet was done on an outside property known as the *Last Chance*, the results from which are reported to have been disappointing.

Preliminary work of surveying was done on Raging river, which flows into Elk lake at its head, for the purpose of determining the capacity of water-power that could be developed for the purpose of supplementing the water-power already developed on Canyon creek.

Alice Lake.

Messrs. Clancy and Kinsey have been busily engaged during 1925 in prospecting the *Alice Lake* group by driving a crosscut tunnel about 100 feet long to intersect the deposit of ore that outcrops on the property. (*See* Annual Report for 1924.) During 1925 a crosscut adit 93 feet long was driven through limestone. It is estimated that approximately by driving 15 feet farther the ore-body that outcrops on the surface 50 feet higher than the level of the tunnel will be intersected.

In addition to the tunnel-work, there has been quite considerable systematic prospecting done on the surface of the claims, which has resulted in exposing other outcroppings of ore of similar character along the line of strike of that first discovered.

Another claim called the *Hornet* was added to the *Alice Lake* group in 1925.

Millington.

Development-work was continued on this group during 1925. General descriptions of the *Millington* group were published in the Annual Reports for 1920 and 1924, in which all particulars with regard to location, geology, occurrence of ore-body, and development-work were referred to; therefore it is unnecessary to repeat here.

A considerable part of the season during 1925 was employed by Spooner Bros. and associates, the owners of the group, in constructing a bridge across Spruce river and improving and widening the trail, so that a wagon or truck can be used for transporting the high-grade ore, of which considerable tonnage has been opened up. The remainder of the season was occupied at the mine in preparing ore for shipment and extending the development-work.

KYUQUOT SECTION.

There have been several new locations of mineral claims made on Easy cove and near the mouth of Kokshittle river, Kyuquot sound, during the past season, but no work other than surface prospecting has been done.

In Easy cove deposits of natroalunite and pyrophyllite occur and cover quite an extensive area adjacent to the shores. These deposits were reported on by Charles H. Clapp in the Summary Report for 1913, Geological Survey of Canada. A full description and report, together with a long list of assays, was also published in the Annual Report for 1920.

Since that time about 120 tons of quartz alunite rock has been mined by the San Juan Mining and Manufacturing Company, of Victoria, in an endeavour to work up a trade for this rock for fertilizing purposes, but the company has not operated regularly on a commercial scale.

There are two groups of mineral claims described in these reports; one group, consisting of the *Morris*, *Snowstorm*, and *Deer Trail* claims, is owned by the San Juan Mining and Manufacturing Company, of Victoria. The other group, containing the *A. T. Monteith*, *Joseph Hunter Fraction*, *Athen Fraction*, *Hastie*, *Morning Glory*, *September Morn*, *Alunite Chum*, *Alunite Princess*, *Alunite Queen*, and *Alunite King* claims, was owned by the Alunite Mining and Products Company, Limited, which company also owned the following claims on the southerly side of Easy cove, opposite the peninsula: *Alunite Prince*, *Governor*, *Percy F. Curtis*, *Sockeye*, *Crater*, and *Evening Star;* also the *Deepwater* and *Hasel* on the west side of Easy cove.

During the past season the last-mentioned group has been acquired by M. D. White and associates, of Victoria, who have been carrying on experiments with regard to the manufacture of pottery and chinaware from some of the rock that was found on the *Sockeye* mineral claim, which very closely resembles kaolin.

Up to the present the new owners have not commenced development-work on a commercial scale on any of the claims mentioned, although the property has been visited twice during the past summer by Mr. White, who brought away large samples for experimental purposes.

Kokshittle River.—Prospecting was done during 1925 on this river about 1½ miles from the head of Kokshittle arm, into which the river flows, and a group of four claims were staked and recorded in May last. The locators of these claims are as follows: The *Connell*, owned by M. D. White; the *Vancouver*, by A. Morgan White; the *Quadra*, by Hilda P. White; and the *Cosmos*, by Marshall Hodgson.

These claims are in the vicinity of the *Caledonia* group, a description of which was published in the Annual Report for 1920. The ore-outcroppings that occur on the claims are chiefly chalcopyrite, but no development-work has yet been done on them.

NANAIMO MINING DIVISION.

The Nanaimo Division covers the largest area of any Division in the Western District. It also includes a much greater mileage of water-front than any other portion of the district. Numerous inlets penetrate the Mainland for distances from 50 to 75 miles in straight lines without considering the sinuosities of the shore-lines. The district also includes that portion of the mountainous sections of the Mainland which is the source of the headwaters of the various rivers which flow into the heads of these inlets. The Nanaimo Division also includes all of the islands between the Mainland and Vancouver island as far north-westerly as the entrance of Seymour inlet and the easterly coast-lines of Vancouver island north-westerly from Ladysmith to the extreme north-westerly end of the island.

The northerly portion of the Division has been practically unexplored by prospectors, mainly owing to the fact that there have been no trails constructed up the rivers above the heads of the various inlets; consequently that part embracing the watersheds of the Southgate, Tatlayoko lake, Homathko and Klinaklini rivers has to be approached from the Chilcotin section of the Province by way of Alexis Creek or from Bella Coola.

Roughly, the eastern boundary of the Nanaimo Division corresponds with the easterly contact of the granodiorite batholith of the Coast range with the older sedimentary rocks, classified by V. Dolmage, of the Geological Survey, Canada, as belonging to the Mesozoic era.

PROSPECTING.

The fact that there were at the end of December, 1925, 350 un-Crown-granted mineral claims in good standing in this Division is evidence that there has been considerable work done both as prospecting and partial development. On many of the claims more work has been done than the annual assessment. A number of these claims warrant the expenditure necessary to carry on further development.

The Mainland portion of the Division, where most of the un-Crown-granted mineral claims in good standing are located, offers exceptionally good opportunities for the prospector to carry on his work. The inlets generally crosscut the rocks of the Coast range and, as they afford good shelter for launches and small boats, a prospector has a good opportunity to carry on his work systematically from a base camp from which he can search for outcroppings at his leisure.

The sections of this Division which have been prospected the most thoroughly are the shores of Jervis inlet and the mountains adjacent; Powell lake and the creeks which flow into it; Malaspina strait between Powell river and Lund; the mountains adjacent to Theodosia arm; the shores of Bute and Knights inlets; Texada, Lasqueti, and Quadra islands; and parts of the east coast of Vancouver island, especially the north-westerly end in the vicinity of the Nahwitti river near Cape Sutil (Commeril). In the interior of Vancouver island there was some prospecting carried on during 1925 in the vicinity of Cameron and Horne lakes, also around Myra and Price creeks at the head of Buttle lake in Strathcona Park.

Most of the prospectors paid more attention to searching for ores carrying lead and zinc values rather than copper owing to the fact that the market price paid for lead and zinc concentrates was high as compared to that paid for copper.

Of interest was the reopening by the Glasord Mining Corporation, Limited, of the old *Doratha Morton* mine which had been closed down since 1899. Under the same management the old *Monte Christo* claim on the opposite side of Fanny bay from the *Doratha Morton* has also been secured, the old development extended, and some shipments of ore made.

The *Alexandria* mine, which has also been idle since about 1900, was opened up by a syndicate headed by C. H. Dickie, M.P., Beaton, and Hemsworth, the two latter gentlemen being of Vancouver. A compressor plant was installed on this property and the old development-work extended. Owing to these operations the settlement of Shoal Bay on Thurlow island, the distributing centre near the mines referred to, has taken on new life and will probably in the future return to its importance of a quarter of a century ago.

Another factor that may prove to be of considerable importance to the metal-mining industry is the renewal of interest taken by the manager of the estate of the late H. Whitney Treat with regard to the properties on Texada island known as the *Van Anda* mines and the group of claims on Jervis inlet known as *Treasure Mountain*. This renewed interest took the form of the engagement of a mining engineer and geologist who made as thorough an examination of the mineral claims included in these properties as was possible unless the old workings had been pumped out.

During the summer of 1925 three groups of prospects situated near the shore of Malaspina strait, about midway between Powell River and Lund, have been bonded to a Vancouver-Victoria company incorporated as the Malaspina Mines, Limited. Each of these groups has been described in some of the Annual Reports since 1917, as follows: *Florence* group, Annual Reports, 1917, 1924; *John Bull* group, Annual Reports, 1922, 1924; *Royal Arch* group, Annual Report, 1924.

Since the new company has taken possession of the mineral claims it has been continuing development-work, which will be fully described later in this report under the heading of "Nanaimo Mining Division."

TATLAYOKO LAKE AND KLINAKLINI RIVER SECTIONS.

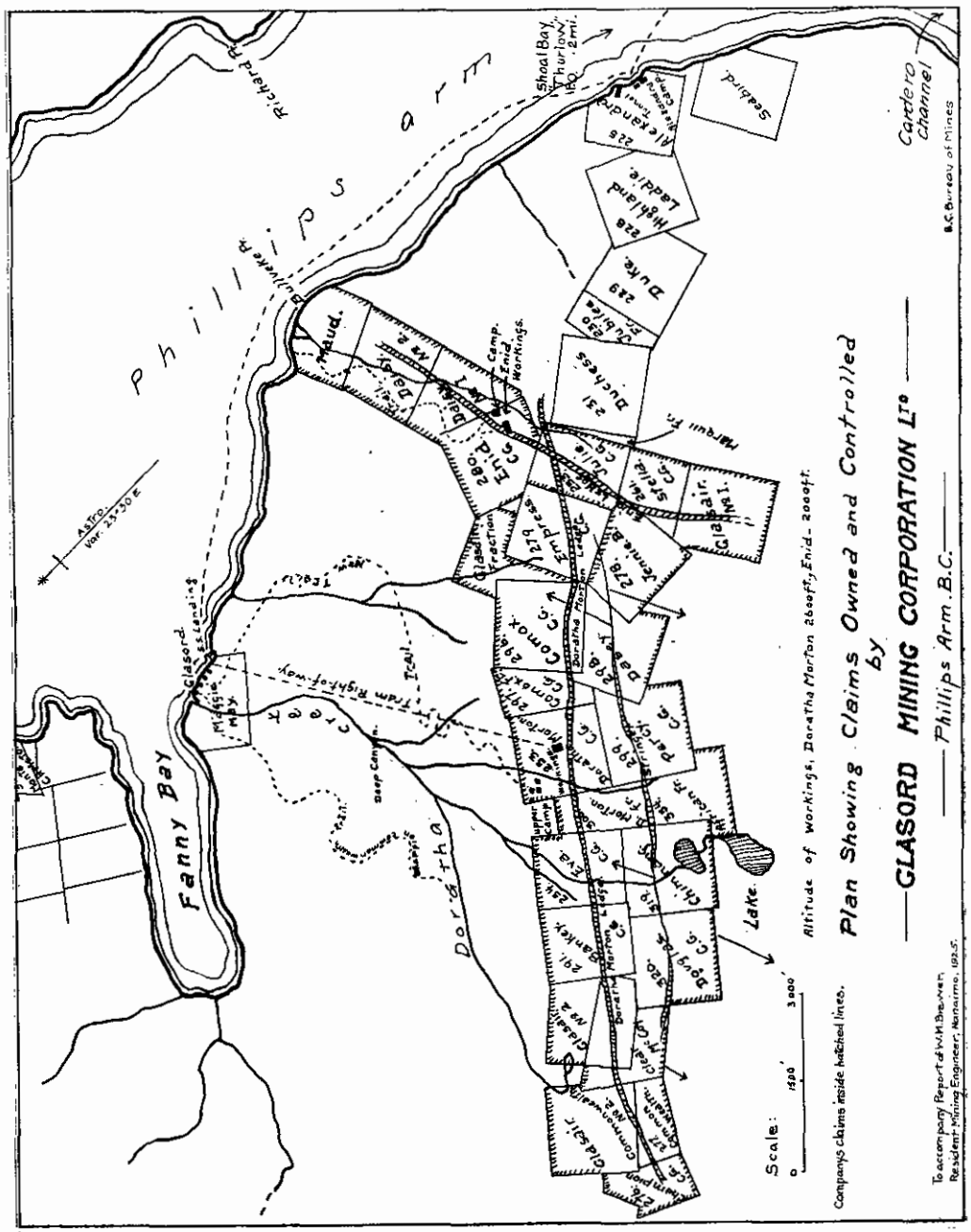
Descriptions of these sections have been published in the Annual Reports for 1910, 1916, 1921, and 1923; and by Victor Dolmage in the Summary Report for 1924, Part A, Geological Survey, entitled "Chilko Lake and Vicinity." Owing to the lack of trails and roads through the greater part of the territory the above-mentioned reports only cover a comparatively small area of these sections. The report in 1916 is the fullest description of the territory, and especially of the route from Bella Coola into the Klinaklini River and Tatlayoko Lake sections.

Since 1922 there has been practically no further development of the Tatlayoko Lake Gold Mines or the Klinaklini River iron-ore deposits, although there has been some prospecting done in the vicinity since 1923. Up to the present there have been no records of discoveries of metallic minerals of sufficient importance to warrant incurring the expenses of a trip by the writer during the past year.

PHILLIPS AND FREDERICK ARMS SECTIONS.

Doratha Morton.

This group is situated near the entrance of Fanny bay, Phillips arm of Cordero channel, about 120 miles northerly from Vancouver. The history of the *Doratha Morton* dates back to 1898, when it was examined and reported on



by the Provincial Mineralogist in the Annual Report for that year; it was also reported on in *the Annual Report for 1899.*

During these two years when the mine was actively operated 9,707 tons of ore was crushed, from which 4,434.08 oz. gold and 10,222 oz. silver were recovered. Late in 1899 work was

discontinued and all mining and milling operations were suspended as the result of the report by Mr. Lang to his company that the ore that could be found was exhausted and that the pay-ore was only in pockets and not in shoots as anticipated. Later the Morrison quartz-mill and cyanide plant, the air-compressor, other mining machinery, and the aerial tramway were dismantled, and until December, 1924, no effort to reopen the mine was made.

Late in the fall of 1924 R. Crowe-Swords, manager for the Glasair Mining Corporation, of Vancouver, acquired the original group of the *Doratha Morton* and also thirty other claims. Fifteen of these claims, including the *Doratha Morton*, *Comox Fraction*, and *Comox* (the original *Doratha Morton* group), are traversed by the quartz ledge or lode known as the *Doratha Morton* mineral-zone, which extends from the westerly shore-line of Phillips arm and the *Alexandria* claim westerly through the claims referred to for a distance of approximately 18,000 feet.

In July, 1925, the Glasord Mining Corporation, Limited, was organized, with the registered office of the company at Rooms 417-18-19 Vancouver Block, Vancouver, for the purpose of acquiring the Crown-granted mineral claims commonly known as the *Doratha Morton* group. The name and address of the vendor to the company is Robert Crowe-Swords, 417 Vancouver Block, Vancouver, B.C.

Operation of the *Doratha Morton* property was commenced in December, 1924, with a force of six or seven men. The property was examined in July, 1925, by which time the following work had been done: The construction of six log cabins at the beach, each one built to accommodate two or three men, excepting the cook-house, which with the kitchen and dining-room has accommodation for about twenty men; the construction of a switchback trail from the beach to the mine-workings on the *Doratha Morton*, a distance of about 2½ miles and reaching an elevation of approximately 2,600 feet; clearing out the old workings of the *Doratha Morton*, which consisted of the No. 1 crosscut adit, 144 feet long, with the east drift about 300 feet long and the west drift about 220 feet long, and the No. 3 crosscut adit known as the main haulage-adit, 650 feet long, with drifts at the face about 40 feet to the westerly and 50 feet to the easterly; construction of mining camp near the old mine-workings, consisting of two large cabins with a capacity to bunk and feed about twenty-five men, also a smaller cabin for office uses; driving a new adit about 50 feet long on the *Doratha Morton* east from the old workings; construction of a new trail from Bullveke point on the shore of Phillips arm to the *Enid*, about 6,000 feet easterly from the *Doratha Morton* workings; driving an adit 50 feet long on the *Enid;* clearing out the old aerial tram right-of-way; general prospecting-work at various points on the *Doratha Morton* quartz ledge.

Near the face of the No. 3 or haulage-adit drifts had been made both to the east and west by the old operators and a small stope had been carried up from the east drift about 20 feet from the original face of the drift, where a well-defined fault occurs. New work by the present operators has broken through the fault and exposed on its easterly side mineralized vein material, indicating that the pay-streak in the ledge extended easterly from the fault, where the development-work by the operators in 1899 had been stopped.

During the examination the writer took five samples from the vein material a few feet easterly from the fault referred to, which samples assayed as follows:—

No. 1, across 15 inches, east drift, assayed: Gold, trace; silver, trace.

No. 2, across 14 inches, east drift, assayed: Gold, 0.10 oz.; silver, 1.2 oz. to the ton.

No. 3, across 21 inches, roof of drift a few feet east from fault, assayed: Gold, trace; silver, 0.2 oz. to the ton.

No. 4, across 12 inches, roof of drift a few feet east from fault south from No. 3, assayed: Gold, trace; silver, 1 oz. to the ton.

No. 5, from floor of east drift from under sample No. 1, assayed: Gold, trace; silver, trace.

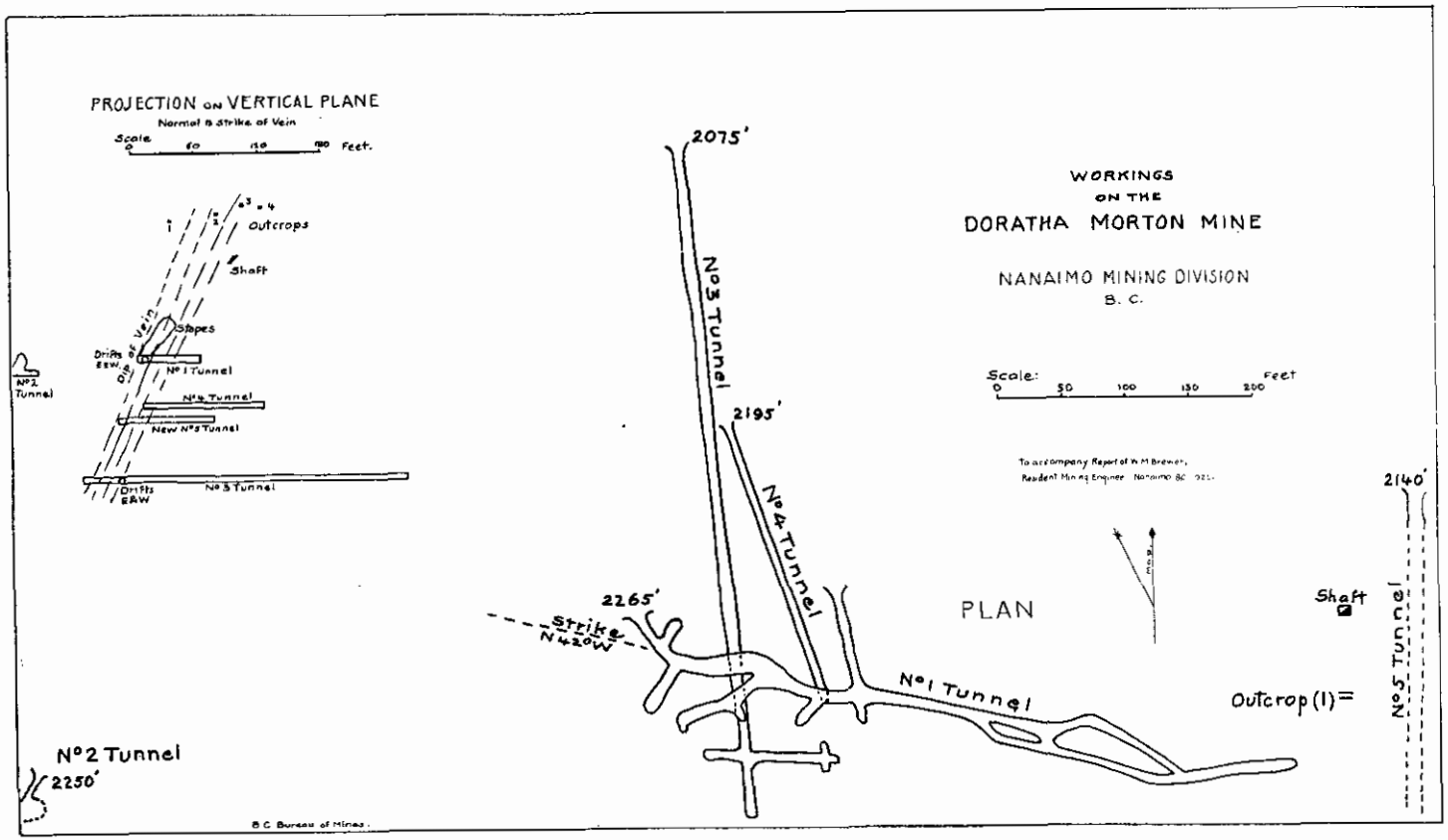
No. 6, from the open-cut above the No. 5 or new adit, assayed: Gold, 0.40 oz.; silver, 0.6 oz. to the ton.

Other samples sent by R. Crowe-Swords assayed:—

No. 1, *Doratha Morton:* Gold, 5 oz.; silver, 20 oz. to the ton.

No. 2, *Doratha Morton:* Gold, 1.80 oz.; silver, 5.2 oz. to the ton; copper, 0.3 per cent.; zinc, 2 per cent.

No. 3, from *Enid*, assayed: Gold, 0.52 oz.; silver, 8 oz. to the ton; copper, 3.5 per cent.


PROJECTION ON VERTICAL PLANE
Normal to Strike of Vein
Scale 0 50 100 150 Feet.
Outcrops
Shaft
Stopes
Dip of Vein
Drifts E&W
No 1 Tunnel
No 4 Tunnel
New No 5 Tunnel
No 3 Tunnel
No 2 Tunnel
WORKINGS
ON THE
DORATHA MORTON MINE
NANAIMO MINING DIVISION
B. C.
Scale: 0 50 100 150 200 Feet
To accompany Report of W. M. Brewer,
Resident Mining Engineer Nanaimo BC 1921.
2075'
2195'
2265'
2140'
No 3 Tunnel
No 4 Tunnel
No 1 Tunnel
No 5 Tunnel
Strike N 42° W
PLAN
Shaft
Outcrop (1)
No 2 Tunnel
2250'
B C Bureau of Mines.

In addition to the above work, the adit on the *Monte Christo* on Fanny bay, across the channel from the beach camp of the *Doratha Morton*, which claim has also been acquired by the company, has been extended 50 feet and a small shipment of ore shipped to the Tacoma smelter for treatment, with satisfactory results.

The new work has apparently shown that the first operators in 1898 and 1899 were hasty in closing down and would have been wiser to have more thoroughly prospected easterly from the haulage-adit beyond the faulted ground, where it appears that the pay-streak in the ledge material is going to be exposed.

Since the examination was made in July, 1925, development operations have been continued, as well as improving the trail from the beach to the mine-workings.

Some small shipments were made for testing purposes, as follows: 2.6 tons, assaying 0.53 oz. gold and 1.42 oz. silver to the ton; 1.4 tons, assaying 1.05 oz. gold, 1.16 oz. silver to the ton, and 2.2 per cent. copper.

Prospecting-work has also been done on the *Julie-Enid* group, which adjoins the *Doratha Morton* group on the east. This has exposed quartz with ribbon-structure that carries good values in gold and silver, but apparently the lead in the mineralized zone is not an extension of the *Doratha Morton* lead, but probably is a pay-shoot almost paralleling it.

A sample said to be from the wall of the shaft being sunk on the *Julie* assayed: Gold, 5.4 oz.; silver, 14 oz. to the ton; copper, *nil;* zinc, 2 per cent.

Another sample of selected ore from the *Julie* assayed: Gold, 6.04 oz.; silver, 16 oz. to the ton.

It appears that the ore will lend itself very readily to concentration and there is a very good site for a mill on the beach, where there is a sufficient supply of water to meet the demands of a medium-sized plant.

The underground workings done since the examination was made in July consists of a new crosscut tunnel on the *Doratha Morton* known as the new No. 5. This has been driven at about 100 feet higher elevation than the old No. 3, which was driven for the main haulage-tunnel. It is expected to intersect the foot-wall of the mineralized zone 200 feet from the portal.

On the *Commonwealth*, about 6,000 feet westerly from the *Doratha Morton*, about 300 feet of drifting and crosscutting has been done from near the north-east corner of the claim.

The work done on the *Julie-Enid* group consists of a crosscut adit driven about 50 feet and a shaft which is being sunk.

Late in the fall of 1925 the employees on the *Doratha Morton* were transferred to the *Monte Cristo* on the opposite side of Fanny bay from the *Doratha Morton* beach camp.

Monte Christo. This mineral claim was prospected and some ore shipped from it about twenty-five years ago, when it was Crown-granted, but a few years ago it was allowed to go to tax sale and reverted to the Crown. The *Monte Christo* has been added to the *Doratha Morton-Julie-Enid-Commonwealth* groups, controlled or owned by the Glasord Mining Corporation, Limited. The old workings, which consisted of a long deep open-cut driven on the strike of the ore-body as an approach to a short adit, were cleaned out and the adit extended about 50 feet. Later a new drift-adit was driven at a lower level with the portal on the shore-line. To date this adit is about 50 feet long.

A small shipment of the ore was made from the extension of the drift in the old workings to the Tacoma smelter, the results from which were so satisfactory that it was deemed advisable to reopen the mine at a level about 400 feet below the old workings by driving a drift about 20 feet above high-water mark, presumably on the same ore-body as was opened up by the old workings.

A trestle was also built from the shore to deep water along which ore could be trammed from the adit to bunkers or loaded directly into a scow or a vessel. Drifting is still being done and the ore that is mined as development proceeds is being shipped to the Tacoma smelter.

Amethyst Group. This group adjoins the west line of the *Monte Christo* and extends into the precipitous mountains in a westerly direction. In the Annual Report for 1920 this group is described. Since that time there has been no extensive work done and it is therefore unnecessary to repeat that description here, but the group is

referred to because it adjoins the *Monte Christo* and because of the indications that the ore-deposits that occur on the *Monte Christo* continue to the *Amethyst* group.

Alexandria Group.

At Picton point, at the entrance to Phillips arm of Cordero channel, the *Alexandria* group of Crown-granted mineral claims, consisting of the *Alexandria*, *Highland Laddie*, *Duke*, *Emperor*, *Jubilee*, and *Duchess*, extends up the mountain to the summit of the Pembroke mountain range in a north-westerly direction. The westerly boundary of the *Duchess* adjoins the eastern boundary of the *Julie* claim of the *Doratha Morton* group.

In the Annual Report for 1920 the *Alexandria* group is fully described as the *Alexandra* group, together with the general geology and the occurrence of the ore-deposit which occurs as a wide ledge of gold-bearing quartz in a belt of metamorphosed shale, schists, and argillites, which are inclusions in the Coast Range granodiorite batholith.

During 1925 this property, together with the *Duco*, *Dory*, *Londonderry*, and the *Blue Bird* un-Crown-granted claims, were acquired by the Alexandria Mines Company, Limited, from Charles Herbert Dickie, who had obtained a lease with option to purchase from the original owners, the Phillips Arm Gold Mines Limited Liability Company.

Previous to the transfer of this lease and option to the new company, Mr. Dickie and associates, Messrs. Beaton and Hemsworth, of Vancouver, had carried on the work of cleaning out the old workings and of extending the development by making an upraise about 50 feet high between the No. 1 adit and the No. 2 adit.

This syndicate had also installed a compressor plant on the shore near the portal of the No. 1 adit, but had suspended work pending the incorporation of the new company, which proposes to resume operations at an early date with a view of developing the property to the producing stage.

Blue Bells Group.

This group, consisting of the *Black Prince*, *Dashwood*, *Gold Bug*, and *Blue Bells* claims, is situated on the west shore of Frederick arm of Cordero channel, about 4 miles south-easterly from Picton point, on the west shore near the entrance to Phillips arm.

The *Blue Bells* group was described in the Annual Report for 1920, during which year prospecting operations were carried on by the Ladysmith Smelting Corporation, Limited, which had an option to purchase, but allowed the option to expire when the smelter was shut down permanently.

Constitution.

At the northern end of upper Thurlow island, near the beacon 1 mile east of Vere cove, the *Constitution* claim, owned by Davie Cox, of Campbell River, is located. The country-rock on and in the vicinity of this claim is made up of Vancouver volcanics and limestone. In a contact between the limestone and the volcanic rocks there occurs a deposit of ore belonging to the metamorphic-contact type, having its line of strike north-easterly and dipping northerly 60°.

The mineralization is made up principally of zinc-blende, but this occurs irregularly, or rather, while the continuity of the ore-body along the strike is very persistent, the values are quite variable, as is shown by two samples assayed, one of which was as follows: Gold, trace; silver, 0.4 oz. to the ton; copper, *nil;* zinc, 36 per cent. This was a specimen sample, but such can be selected from many parts of the deposit along the strike and can be found on the dump. Another sample taken as an average across 4 feet of vein-matter at the face of an adit assayed: Gold, *nil;* silver, *nil;* lead, trace; zinc, 1 per cent.

There has been a drift-adit driven 65 feet, closely timbered for the first 30 feet, but from that point the walls and roof stand without timbering. It was at the face of this adit that the average sample across 4 feet was taken during the examination in July last. Beyond the timbers in the adit the ore-body is split up into several stringers and for about 12 feet the adit was driven in volcanic rock on the foot-wall side. The course of the adit at this 12-foot point was then changed, a pillar being left standing about 2 feet wide between the main drift and the part that was wrongly followed, and from that point the adit was continued with the mineral showing in the roof to the face which was sampled.

In addition to the adit there is a winze sunk about 30 feet deep below the floor of the adit, said to be all in ore, but being full of water could not be examined. Davie Cox, an old prospector, has held this claim for several years and most of the work had been done by himself.

KNIGHT INLET SECTION.

During 1925 a few prospectors have been working near the head of Knight inlet and for about 10 miles up the Klinaklini river from its junction with Knight inlet. The results from this have been that several claims have been staked and copper-sulphide ore has been brought in, which is said to have been found in surface outcroppings and would indicate that this section merits serious attention from prospectors.

In the Annual Report for 1919 there are full descriptions of the *Princess* and *Union* groups, on which prospecting-work was being done at that time, but since then work has been closed down owing to a great extent to the unsatisfactory price of copper. Since then until the past year there has been practically no attention paid to the mineral-deposits in this section.

An encouraging feature with regard to the Knight Inlet section is the fact that prospectors found good outcroppings above the mouth of the Klinaklini river. This will undoubtedly result in more prospectors working in that section during the coming season. It is an ideal part of the Nanaimo Division to prospect.

NAHWITTI RIVER SECTION.

During July, 1925, the writer made a trip with a gasolene-launch from Campbell river to Cape Sutil, at the extreme northerly end of Vancouver island and west of the Nahwitti river, the object being to examine some mineral-deposits near the mouth of Cache creek, about 10 miles westerly from the mouth of the Nahwitti river, but owing to the heavy westerly winds prevailing at the time the attempt had to be abandoned. At Shushartie bay it was learned from reliable sources that A. W. Green, of California, the manager of a syndicate that had been engaged in prospecting some mineral claims on Cache creek and vicinity, had closed down the works and left for a visit to the United States.

According to the records in the Mining Recorder's office at Nanaimo, there are thirty-six mineral claims un-Crown-granted in good standing near the coast between the vicinity of Shushartie bay and Fisherman cove near Cape Scott, west of Cache creek, that are at present owned by the original locators. These are badly handicapped with regard to transportation facilities for the reason that all of the coast-line on Vancouver island westerly from Shushartie bay is open to the full force of the Pacific ocean. Consequently, in order to open this section of the island for mining on a commercial scale, it would be necessary to construct a wagon-road from Shushartie bay to Fisherman cove, which would entail a very considerable expenditure, not justified by the present development. Most of the mineral claims in this section of Vancouver island are owned by a few prospectors, chief among them being Henry Shuttleworth, Nelson Grayburn, and a few others, who deserve great credit for the work they have done under very adverse conditions.

The incentive to prospecting this section was first caused by the discovery of some beds of black sands along the coast from the mouth of the Nahwitti river to Fisherman cove, which resulted in the application for quite a number of placer leases, but although no reliable information with regard to the actual production from these leases can be obtained, the fact that they were all abandoned would imply that no profitable operations had been carried on. Locating lode-mineral claims followed the applications for placer leases, and there is no doubt that if the transportation handicap could be removed a good many prospectors would be attracted to the section and that systematic development might result in opening up some properties on which the chief value in the ore is zinc.

QUATSE LAKE SECTION.

This section of Vancouver island between Hardy bay and Coal harbour extends for a few miles north of the wagon-road that has been constructed between those two points, with Hardy bay on the east coast and Coal harbour on the West arm of Quatsino sound on the west coast.

In the Annual Report for 1923 this section is fully described, including a detailed report on the *Caledonia* group, owned by T. D. Harris and Robert A. Grierson, of Hardy Bay, and Mr. and Mrs. Murray C. Potts, of Alert Bay; consequently it is unnecessary to repeat these descriptions here, but attention is called to the section for the reason that the road beween Hardy bay and Coal harbour has been at last constructed as an automobile-road, and following that construction the transportation facilities for moving supplies into or ore concentrates out of the section are very much improved.

Prospectors will in future be able to explore the territory adjacent to the wagon-road by establishing a base camp and merely packing their supplies a short distance instead of over the old trail on their backs, which condition will be greatly appreciated and tend to make the section an attractive one for prospectors to work in.

During the summer of 1925 the owners of the *Caledonia* group have extended the development-work considerably and were expecting that the Coast Copper Company would place a diamond-drill on the property and prospect it under an option to purchase, but that work was postponed for the time being.

The owners of the *Caledonia* group have improved the trail between the Hardy Bay–Coal Harbour road and their property very materially, so that a good deal of the handicap made by lack of transportation has now been removed.

CAMPBELL RIVER SECTION.

For convenience this name is applied to a section of the Nanaimo Division of which Campbell River is approximately the centre and point where supplies can be obtained and distributed. In this section is included the east coast-line of Vancouver island from Comox to Humpback bay, a few miles up the coast from Rock bay, and Quadra, Sonora, and Redonda islands, as well as that portion of the interior of Vancouver island in the mountainous sections around the Lower and Upper Campbell lakes, Campbell river, and Buttle lake.

Campbell River settlement is advantageously situated for a centre of the section just described, because it is a port of call for practically all coastwise vessels, and is also connected with Courtenay, the northern terminus of the Esquimalt & Nanaimo Railway, by a good automobile-road.

The lode-mining industry has not been as active in this section for the past few years as it was in 1916 to 1922, during which years the Valdez Island Copper Mining Company was operating the *Ingersoll* group on Quadra island near Gowland harbour.

During July a very extensive forest fire burnt on Quadra island and in the section between Granite bay on the west coast and Heriot bay on the east coast of the island, destroyed considerable timber, and in addition destroyed the buildings at the old *Lucky Jim* mine about 4 miles from Granite bay.

As the fire was most fierce on the limestone-belt and along the contact with granodiorite which extends across the island, the result has been that the surface of the rock formations has been swept clean from the underbrush and small timber which made prospecting and the search for surface outcroppings more difficult than will be the case since the forest fire.

It was an unfortunate occurrence that just about the time of this fire negotiations were in progress towards the resumption of work at the *Lucky Jim* by a company which proposed to bond the property from the present owners. These negotiations fell through by reason of the destruction of all the buildings and machinery.

Spider. Close to the west shore of Discovery passage, above Seymour narrows, a prospector named John Snapley, of Rock Bay, discovered an outcropping of chalcopyrite ore in the face of a steep bluff which he had been prospecting for some time past. The outcropping occurs in a shear-zone in a black igneous rock which contacts with granodiorite. In the shear-zone is a well-defined vein-structure that extends from the beach for about 100 feet in height in the face of a precipitous bluff which forms the shore-line at this point. The strike of the vein-structure is magnetic west; the dip, 80° N. The shear-zone is intruded by several igneous dykes. A sample taken from the foot-wall of the vein across 12 inches assayed: Gold, 0.06 oz.; silver, 2 oz. to the ton; copper, 14.5 per cent.; zinc, *nil*.

No work had been done on this vein because of the difficulty in starting an adit in the face of the bluff, where there was no beach even at low water, and during the winter storms the surf would wash into any workings 30 or 40 feet high. No dump could be secured because of the shear precipitous face of the bluff; consequently Mr. Snapley had confined his prospecting-work to other points, but he had been unable to find any ore carrying commercial values, although he had obtained mineralized rock in other portions of the shear-zone.

At other points along the coast in the vicinity of Rock bay some prospecting-work was being done during 1925, the most important of which was near Humpback bay, at the mouth of a stream locally known as Big Bear river, in which vicinity several outcroppings of chalcopyrite

ore were discovered and some development-work carried on. Several mineral claims were recorded in this neighbourhood and there is a prospect that during the coming season a considerable amount of work will be done.

The precipitous mountain range which forms the shore-line of Vancouver island generally along this portion of the coast is a considerable handicap for the prospector to overcome, because landing-places even for small boats are confined to few places, such as Elk bay, Rock bay, and Humpback bay, in addition to a small bay about half a mile from the point where Snapley discovered the outcropping upon the *Spider*.

Paramount Mining Co.

This company, which owns a large group of mineral claims on Myra and Price creeks at the head of Buttle lake, and which diamond-drilled about 2,000 feet on the *Lynx*, *Paw*, and *Shot* groups in 1920, did not resume work during 1925, except by doing the regular annual assessment-work on some claims that had not been previously Crown-granted. The operations of this company, together with the general conditions as to geology, geography, and the ore-deposits, were fully described in the Annual Report for 1920.

Since the diamond-drilling work was closed down in the late fall of 1920 the company has each year had a force of men prospecting and doing the annual assessment-work, and each year has Crown-granted several claims, selecting those which prospecting-work had shown to be the most promising.

Transportation facilities will enter largely into the operations of mining properties in this section of the Nanaimo Division, because the following conditions will have to be taken into consideration: Transportation by aerial tramway from the mine-workings to the head of Buttle lake, a distance of about 1½ miles; transportation by scow or light-draught vessels from the head to the foot of Buttle lake, a distance of about 22 miles; the construction of a railway from the foot of Buttle lake to the settlement of Campbell River, a distance of about 25 miles; transportation by water from the Campbell River settlement to the smelter.

In order to determine whether the mineral claims contain a sufficient tonnage of ore in sight to warrant the expenditure of capital necessary to overcome the transportation difficulties, a very considerable expenditure of capital for development purposes will have to be incurred. The prospecting-work that has been done so far apparently indicates that the company proposes in the not-far-distant future to continue the development-work for the reason that such a large number of mineral claims have been Crown-granted, and apparently the company is only waiting for more satisfactory market conditions with regard to copper before engaging in the extensive work necessary.

Up to the present time there have been no mineral claims other than those owned by the Paramount Mining Company recorded in the Buttle Lake area, although there has been some desultory prospecting done by a few old-time prospectors who are well acquainted with that section of the country.

INTERIOR OF VANCOUVER ISLAND SECTION.

This section of the Nanaimo Division includes the easterly portion of Vancouver island as far inland as the easterly slope of the Beaufort range of mountains and that portion northerly from the foot of Buttle lake to Nimpkish lake which may be said to be unexplored. About all that is known of it has been ascertained from trappers and timber-cruisers.

This area is outside of the Esquimalt & Nanaimo land-grant, but the transportation question would be a problem quite hard to solve and the difficulties that a prospector would have to contend with so great that it is questionable whether under present conditions it is advisable for prospectors to attempt the search for minerals except along the several streams, such as the Nimpkish river, Adams river, Salmon river, White river, the headwaters of Big Bear river and others, which have their sources in the northerly part of the Beaufort range of mountains, which forms the backbone of Vancouver island.

TEXADA ISLAND.

Texada is the largest island in the Nanaimo Division. It lies in the strait of Georgia and is 30 miles long and 6 miles wide.

The published history of this island dates back to 1873, when the first observations on the geology and the iron-deposits on the west side were made by James Richardson, of the Geological Survey of Canada. His report was published in the Annual Report of the Survey for 1873–74.

The bibliography of Texada island is as follows:—

Dr. G. M. Dawson, Annual Report, 1885, Geological Survey of Canada, Vol. 2, pp. 36 to 37B.

I. P. Kimbell, in the American Geologist, Vol. 20, 1897, pp. 19 to 27, wrote an article on the character and origin of the magnetite lenses.

William Fleet Robertson, Provincial Mineralogist, Annual Report of the Minister of Mines, B.C., for 1902, pp. 225 to 228.

References to the progress of mining on the island, the Annual Reports of the Minister of Mines, B.C., for 1897, 1899, and 1903.

O. E. LeRoy, 1906 Annual Report, Geological Survey of Canada, entitled "Preliminary Report on a portion of the main coast of British Columbia and adjacent islands," published in 1908.

William M. Brewer, in the Journal of the Canadian Mining Institute, Vol. 7, 1905, p. 172, "The Origin of Bornite Ores on Texada Island."

E. Lindeman, the Mines Branch, Department of Mines, Canada, on the iron-deposits of Texada island, published in the Annual Report 47, Geological Survey of Canada, pp. 21 to 24.

R. G. McConnell, Memoir 58, Canada Department of Mines, Geological Survey, "Texada Island, B.C.," published in 1914.

William M. Brewer, "Iron-ore Deposits of Vancouver and Adjacent Islands," pamphlet form, 1916, also in the Annual Report of the Minister of Mines for 1916.

Victor Dolmage, "The Marble Bay Mine, Texada Island, B.C.," Economic Geology, Vol. XVI., October, 1921.

William M. Brewer, Resident Engineer, Western Mineral Survey District (No. 6), in the Annual Reports of the Minister of Mines for 1917 to 1921.

Present Conditions.—Since 1921 there has been little activity in metal-mining on the island until interest was revived in 1925. The estate of the late H. W. Treat, which was heavily interested in the Van Anda Company, owning the *Copper Queen*, *Cornell*, and *Little Billie*, all of which have produced copper-gold-silver ore on a commercial scale in past years, engaged Charles Davis, mining engineer, of Seattle, to make a detailed examination of the property as far as was possible without unwatering the old mines. This was with the view of interesting capital in reopening the mines and resuming operations below the levels that had been reached in past years. Negotiations are still pending and it is expected that during 1926 they will be consummated.

The *Copper Queen* has been worked to a depth of about 700 feet, the *Cornell* to about 600 feet, and *Little Billie* to about 300 feet. When the fact is considered that the *Marble Bay*, which adjoins the old Van Anda Company's holdings, has been worked to a depth of approximately 1,700 feet, with ore below that level as determined by diamond-drilling, and that ore-bodies in the other mines occur under similar geologic conditions, it would seem that they, too, might continue to at least the same depth.

Gem Group. This group consists of five Crown-granted mineral claims and was originally known as the *Nutcracker*. It is near the east end of Kirk lake and is connected with Vananda by a good wagon-road. Early in 1925 a private company, the British Columbia Gold Mining Company, was organized by the syndicate which had been operating the mine in 1924 on a small scale. This company took over the lease and bond held by J. McConville, of Vananda, which he had obtained from A. A. Loggan, of Vancouver. Later in the year the private company was incorporated as a limited non-personal liability company under the name of the British Columbia Gold Mines, Limited (N.P.L.), which company has continued the development-work that had been commenced under the private charter.

In the Annual Report for 1924 the property was described. As development was carried on in 1925 the showings were re-examined and a further report is considered advisable.

History.—About 1894 an old-time prospector named Hughie Kirk discovered surface outcroppings of gold-bearing quartz veins in a wide belt of porphyrite in the vicinity of Spectacle and Kirk lakes. These discoveries were followed by the staking and recording of several claims in 1895, amongst them the old *Nutcracker*. A shaft was sunk in 1896 to a depth of 18 feet in good ore. This work was continued until 1898 and gold was recovered amounting to about $2,000 before work was suspended in that year. From that time until 1923 nothing was done on the group, which had meanwhile been Crown-granted.

During 1923 J. McConville, an old-time resident on Texada island, began systematic prospecting and found sufficient encouragement to secure a lease and bond from the recorded owner. He followed this up by cleaning out the old workings, which consisted of a shaft about 50 feet deep and drifts in easterly and westerly directions from the bottom of that shaft, also some open-cut or trench-work on the surface. While prospecting one of these trenches near the shaft McConville discovered kidneys of quartz in which free gold was visible to the naked eye, and sometimes occurred as small nuggets.

This discovery encouraged McConville to extend the easterly drift, and in doing so he encountered a fault through which he drove, and after picking up the vein on the easterly side of the fault found values in the quartz vein and occasionally lumps of quartz in which free gold was visible to the naked eye. With this encouragement McConville made an arrangement with the McTavish Bros., of Vancouver, to finance further development-work, equipping the mine with a Petter 14-horse-power semi-Diesel engine, an Ingersoll-Rand Cochise machine-drill, pump and hoist, with a Fairbanks-Morse gasolene-engine to run the small hoist. A Denver quartz-mill and crusher were also installed, but it was not until the spring of 1925 that new development-work consisting of the sinking of a new shaft at a point of about 125 feet easterly from the old shaft was undertaken.

Geology.—The country-rock on the *Gem* is a brownish porphyrite sprinkled with dull feldspar and blotched with rounded areas filled with quartz, calcite, and epidote. According to McConnell's diagram showing the geology of Texada island, the porphyrite rock in this portion extends south-westerly from Spectacle and Priest lakes to the coast on the west side. The easterly boundary of the porphyrite occurs at its contact with Marble Bay limestone about a mile east from Kirk lake, where the strike of the contact is north-westerly for a distance of about 3 miles to the north-westerly boundary of the porphyrite and its contact with superficial deposits near Crescent bay.

About a mile south-easterly from the *Gem* the porphyrite contacts with the Marble Bay limestone, the line of strike of the contact being in a southerly direction to the base of Surprise mountain. The entire area in porphyrite here is about 5 miles from north-west to south-east and about 2½ miles from south-west to north-east.

The porphyrite is traversed by several fissure-zones, that on the *Gem* being from 3 to 4 feet wide filled with veinlets, chiefly quartz, but occasionally some calcite. The quartz in these veinlets contains crystals of galena, occasional specks of chalcopyrite, in places solid crystals of pyrite, and small amounts of arsenopyrite and pyrrhotite.

Ore-deposits.—The ore-body on the *Gem* belongs to the fissure-vein type. While the fissure-zone itself is between 3 and 4 feet wide, it is only in places that the full width is filled with quartz; this condition is clearly shown in the roofs of the drifts on the 50- and 100-foot levels, where the fissure is not filled entirely with quartz, but consists in part of country-rock traversed by narrow veinlets of quartz. It is generally in such parts of the vein that high-grade specimen ore occurs.

The values carried in the fissure are most erratic and ordinary sampling by channelling sections across the vein is most unsatisfactory and unreliable, for the reason that within a few inches of a moiled sample which may only assay $2 or less in gold a lump of ore may occur that will assay several hundred dollars; the only satisfactory method, therefore, of determining values is by mill test of several tons of what may be termed "run-of-mine ore."

A peculiar condition is found to occur in the drift from the new shaft on the 100-foot level, where a fault crosscuts the fissure at right angles. This fault has been noticeable from the outcrop down and for a width of several inches along the fault-plane in the drift there occurs thoroughly oxidized quartz from which can be panned gold indicating high values to the ton. This fault is exposed about 80 feet west from the new shaft in the drift on the 100-foot level. To the west of the fault, while the fissure-zone maintains its continuity along its strike, it carries negligible values.

Samples.—East of the fault the vein carries values, but so irregular that ordinary sampling is unreliable; for that reason during the recent examination no attempt to systematically sample the vein was made. Three samples only were taken: No. 1, from across 18 inches at the westerly face of drift on the 100-foot level; No. 2, from quartz along the fault-plane in the drift on 100-foot level; No. 3, general sample from sorted ore on the dump which was said to have been mined from the drift on the 100-foot level during the driving. These samples are not to

be considered in any way as representing average values in the vein, which can only be determined from a mill test as already stated.

No. 1 sample assayed: Gold, *nil;* silver, *nil;* copper, *nil.* No. 2 sample assayed: Gold, 0.06 oz.; silver, 0.04 oz. to the ton; copper, *nil.* No. 3 sample assayed: Gold, 2.6 oz.; silver, 0.6 oz. to the ton; copper, *nil.*

In the description of the *Gem* in the Annual Report for 1924 three samples are mentioned as having been taken across 2 feet at three different points in the roof of the drift on the 50-foot level from the old shaft, which assayed as follows:—

No. 1, across 2 feet in the roof of the drift 33 feet from the face: Gold, 0.14 oz.; silver, 0.08 oz. to the ton.

No. 2, across 2 feet at a point 7 feet west from No. 1: Gold, 0.28 oz.; silver, 0.12 oz. to the ton.

No. 3, across 2 feet at a point 7 feet farther west: Gold, trace; silver, trace.

During the examination on June 6th last, when the new shaft had been sunk to the 50-foot level and connected with the drift from the old shaft on that level, five samples were taken from the roof of the drift at regular intervals, beginning at a point 24 feet west from the new shaft and taken across the roof in sections 3 feet apart; these assayed as follows:—

No. 1, across 2 feet 6 inches at a point 24 feet west from the new shaft, assayed: Gold, *nil;* silver, *nil.*

No. 2, across 4 feet 6 inches at a point 3 feet from sample No. 1, assayed: Gold, trace; silver, trace.

No. 3, across 5 feet at a point 3 feet west from sample No. 2, assayed: Gold, trace; silver, trace.

No. 4, across 3 feet at a point 3 feet west from sample No. 3, assayed: Gold, 0.30 oz.; silver, 0.4 oz. to the ton.

No. 5, across 2 feet 6 inches at a point 3 feet west from sample No. 4, assayed: Gold, 0.14 oz.; silver, 0.2 oz. to the ton.

Although these samples are mentioned in this report, it is only fair to say that specimen ore was taken from this drift while it was being driven, and that is the reason why it has been already stated that hammer and moil sampling is unreliable.

Development-work.—During 1925 a new shaft has been sunk in country-rock near the vein about 125 feet easterly from the old shaft. The new shaft had, when recently examined, reached a depth of 150 feet, with an extra 10 feet for sump. Drifts have been driven from this shaft on the 50- and 100-foot levels. The drift on the 50-foot level is an extension to the east of the drift on the same level from the bottom of the old shaft. The drift on the 100-foot level is about 140 feet long, with the vein exposed from a point about 12 feet west from the shaft. On the 150-foot level a drift has been started westerly from the shaft in which ore had just been exposed at the time of the recent examination about 12 feet from the shaft. It is proposed to continue to drive the drift on the 150-foot level westerly on the vein.

Marjorie Group.

This group is situated north of Spectacle lake in the porphyrite formation near its contact with the Marble Bay limestone. In the Annual Reports for 1921 and 1922 this group is described, but during 1925 further work was done by J. McConville, of Vananda, who has acquired title to the property.

The new work is on the *Saga*, one of the *Marjorie* group, and consists of cleaning out and extending an open-cut, which lies about 220 feet southerly from the main shaft, on a quartz vein the strike of which parallels the "main shaft" vein. This cut was sunk 8 feet below its original floor for a length of 39 feet to a new shaft 9 by 5 feet in the clear. The latter could not be examined because of water. In the open-cut, driven along the strike of the ore-body, the maximum width of the vein is 4 feet and the minimum width is 2 feet. No systematic sampling of the vein exposed in the open-cut was attempted because of the irregular values carried by all the quartz veins on this portion of Texada island and because the only reliable sampling is by a mill test of several tons of "run-of-mine ore."

About 23 feet southerly from the shaft there is another fissure in a shear-zone in the porphyrite country-rock in which occur narrow stringers of quartz, in most of which free gold is visible to the naked eye. This shear-zone has been prospected by an open-cut 8 feet deep at the face.

The vein known as the "main shaft" vein has been stripped for 98 feet westerly from the shaft, and this stripping shows the vein to vary from 1 to 4 feet in width, the vein-filler being quartz in which occur crystals of pyrite, some pyrrhotite, and a little galena.

There are seven veins, all told, outcropping in a width of 210 feet. At a distance of 140 feet north of the main shaft is another vein known as "No. 8." This has been exposed by an open-cut for a length of 115 feet, the cut being sunk to bed-rock. The lines of strike of all of these veins are almost due west, while the dips are practically vertical.

Samples.—Two grab samples were taken, one from a dump which represented ore taken from the west drift of the main shaft on the 50-foot level; another a grab sample from the dump from an open-cut on the "No. 8 vein." The first of these assayed: Gold, 1.98 oz.; silver, 0.5 oz. to the ton. The other assayed: Gold, 2.56 oz.; silver, 0.6 oz. to the ton. The dumps from which these samples were taken represent ore sorted after it was mined and are not to be considered averages or "run of mine."

Stromberg Group.

This group contains the *Edith*, *Kate*, *Delora*, *Hill*, *Ethel*, *Bullion*, and *Big Bluff* claims, situated on the south-westerly coast of Texada island, about 1 mile westerly from the slope of Mount Davis, at an elevation of 800 feet. The property is owned by William Stromberg, of Vananda, and associates. The claims are staked in a north-easterly direction from the shore-line, with the south-westerly part of the *Edith* occupying the shore-line about 8 miles south-easterly from Gillis bay. Five of the claims are staked one claim wide; the farthest north-easterly of these claims is the *Ethel*, and adjoining it on the easterly side is the *Bullion*, with the *Big Bluff* adjoining.

Geology.—The prevailing country-rock on and in the neighbourhood of these claims is porphyrite, but on the *Bullion* there occurs a belt of undetermined extent of limestone in which the porphyrite occurs as an intrusive. The porphyrite has been very much sheared and fissured and it is within the sheared zones where sulphide ores which carry copper values occur. The shear-zones can be followed through the group in a general north-easterly direction, but appear to attain the greatest width on the *Bullion* and *Big Bluff*.

Ore-deposits.—Outcroppings of sulphide ores are found on the *Edith* near the shore, also on the *Bullion* and *Big Bluff*. The ore-deposits may be classed as belonging to the contact-metamorphic type as they occur near the contact between the limestone and porphyrite, but in some places the ore occurs in fissures in the shear-zones in the porphyrite, so that there appear to be representatives of the two leading types of ore-bodies characteristic of Texada island.

There are also outcroppings of copper-sulphide ore on the *Ethel*, which adjoins the *Bullion* on the north-west, and some open-cut work and trenching has been done, but at the time of the examination this work had not determined any important data. On the other claims in the group prospecting has been unimportant.

The property as a whole would appear to possess considerable merit and warrant further thorough prospecting, which might warrant the expenditure of sufficient capital to carry on development-work on an extensive scale.

Development-work.—On the *Edith* near the beach a shaft has been sunk 60 feet deep, but at the time the examination was made this shaft was full of water and could not be examined.

On the *Bullion*, about the centre of the location-line between the *Bullion* and *Big Bluff* claims, a shaft has been sunk 14 feet deep, but as this was caved and full of water it could not be examined. From near the collar of this shaft an open-cut has been made in a north-westerly direction 52 feet. For 16 feet this cut has caved in and could not be examined. At 16 feet a diorite dyke 14 feet wide crosses the open-cut, and beyond this dyke the cut has been continued for 22 feet to its face. From this point the cut was continued in a westerly direction 52 feet and crosscuts the shear-zone in the porphyrite diagonally. In this cut several lenses of ore, which occur in fissures in the shear-zone, were exposed. Near the face of this cut is the "discovery post" of the *Bullion*. Stripping has been done in a north-easterly direction from the "discovery post" 28 feet in length and a shallow shaft sunk near the end of the stripping. The main open-cut has been continued from the "discovery post" to the north-westerly side of the shear-zone where a shaft has been sunk about 12 feet deep. This could not be examined as it was full of water and considerably caved in. About 45 feet south-west of the shaft another shallow shaft has been sunk and the shear-zone stripped for 30 feet farther north-westerly.

All of the above-mentioned shafts are connected by the open-cuts mentioned, so that the development-work really represents open-cutting and stripping for a total length of approximately 245 feet.

About 50 feet south of the last-mentioned shaft there is open-cut work 40 feet long which exposed the limestone-contact on the south-easterly boundary of the shear-zone. On the opposite boundary the porphyrite rock has an amygdaloidal structure, but how extensive an area this covers has not been determined.

Samples.—Four general samples were taken from places on some of the dumps along the open-cuts and at the collars of the shafts, with the following results:—

No. 1, from the *Bullion*, a grab sample from the dump along the first cut mentioned, assayed: Gold, trace; silver, trace; copper, 3.3 per cent.

No. 2, from the *Bullion*, a grab sample from a dump at the collar of the 12-foot shaft, assayed: Gold, trace; silver, trace; copper, 3 per cent.

No. 3, a grab sample from a dump of the same shaft from ore that had been sorted for shipment, assayed: Gold, trace; silver, 1 oz. to the ton; copper, 7.1 per cent.

No. 4, a grab sample from the dump of the shaft on the *Edith* near the beach, assayed: Gold, trace; silver, 0.6 oz. to the ton; copper, 8.7 per cent.

Vananda Copper and Gold Co.

As stated above, a move was made during 1925 by the manager of the estate of the late H. W. Treat to revive interest in the *Copper Queen*, *Cornell*, and *Little Billie*, as well as in the several other claims located on the Crown-granted land formerly owned by the old Vananda Copper and Gold Company, but which passed into the hands of the debenture-holders about twenty years ago. In past years each of these mines has been worked spasmodically by lessees who apparently had only one object in view, which was to extract all the ore in sight without carrying on any proper development-work and without attempting to recover all values in the ore. Even at that, each one of these mines has paid several hundred thousand dollars in gross returns during the operations, and undoubtedly still contains large values which can be recovered by using suitable engineering and metallurgical methods. The ores are bornite and chalcopyrite which carry a very appreciable proportion of gold as well as silver and copper.

The examination made during 1925 by Charles D. Davis for the Treat Estate was as thorough as was possible unless the mine-workings had been unwatered. The report made after this examination is quite comprehensive and includes copies of all reports made in the past, as well as all the smelter returns from 1902 to date, giving returns of the various shipments of ore to the Tacoma and Tyee Copper Company's smelters. Maps are also included of the north-east portion of Texada island; geological study of the Vananda properties; location map of Vananda properties; workings on the *Cornell*, on the 80-, 160-, 260-, and 360-foot levels; workings on the 460-foot level on the *Cornell; Little Billie* workings; and *Copper Queen* workings. In his report Davis gives greater consideration to the igneous intrusions in the geologic formation than has been the case generally in other reports. In this respect it might be interesting to quote from him as follows:—

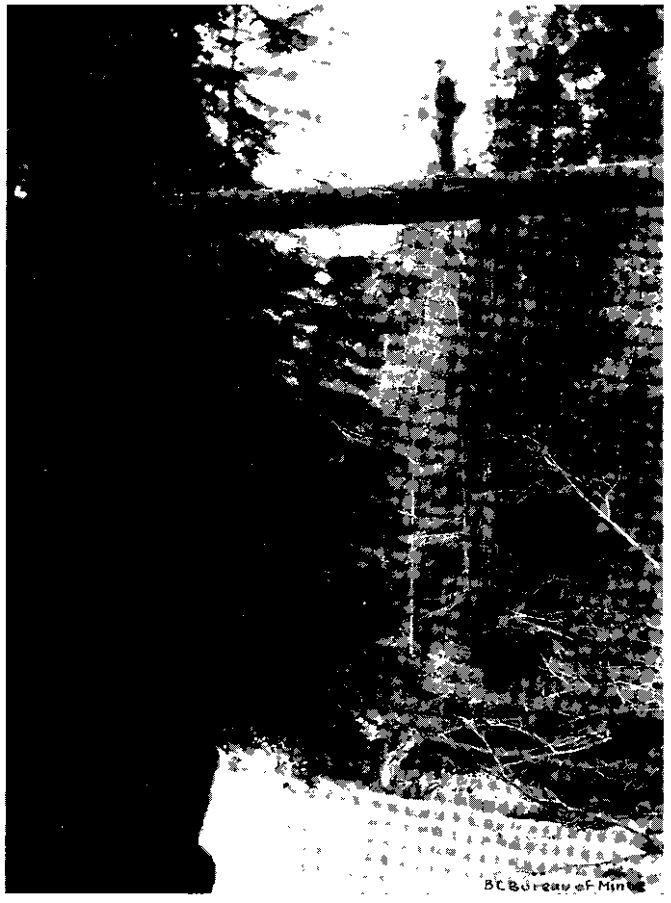
"*Geologic Formation.*—The geology of this portion of Texada island is simple. The formations are few and are principally of igneous origin. The area covered by this report should be classified as of Lower Jurassic age. Basic formations consisted of earlier limestone commonly known as crystallized or marbleized lime areas. During the Cretaceous period many diorites and diorite porphyrites in stocks and dykes of considerable continuity were intruded into the older lime areas. Following closely this period additional lime areas developed which are commonly known as the blue limestone; showing decidedly the limestone areas are of two distinct ages. In dealing with the earlier limestone areas we find them to have been crystallized by repeated igneous invasions and the intruded mineralizing agents which accompanied these invasions.

"This limestone has been considerably altered by contact with metamorphic minerals. This older or crystallized or marbleized lime often contains magnesium bands. The commonly called blue lime, however, does not show this crystallized condition and is bluish-grey in colour, close-grained, is very pure, and produces fine quality white lime when burned.

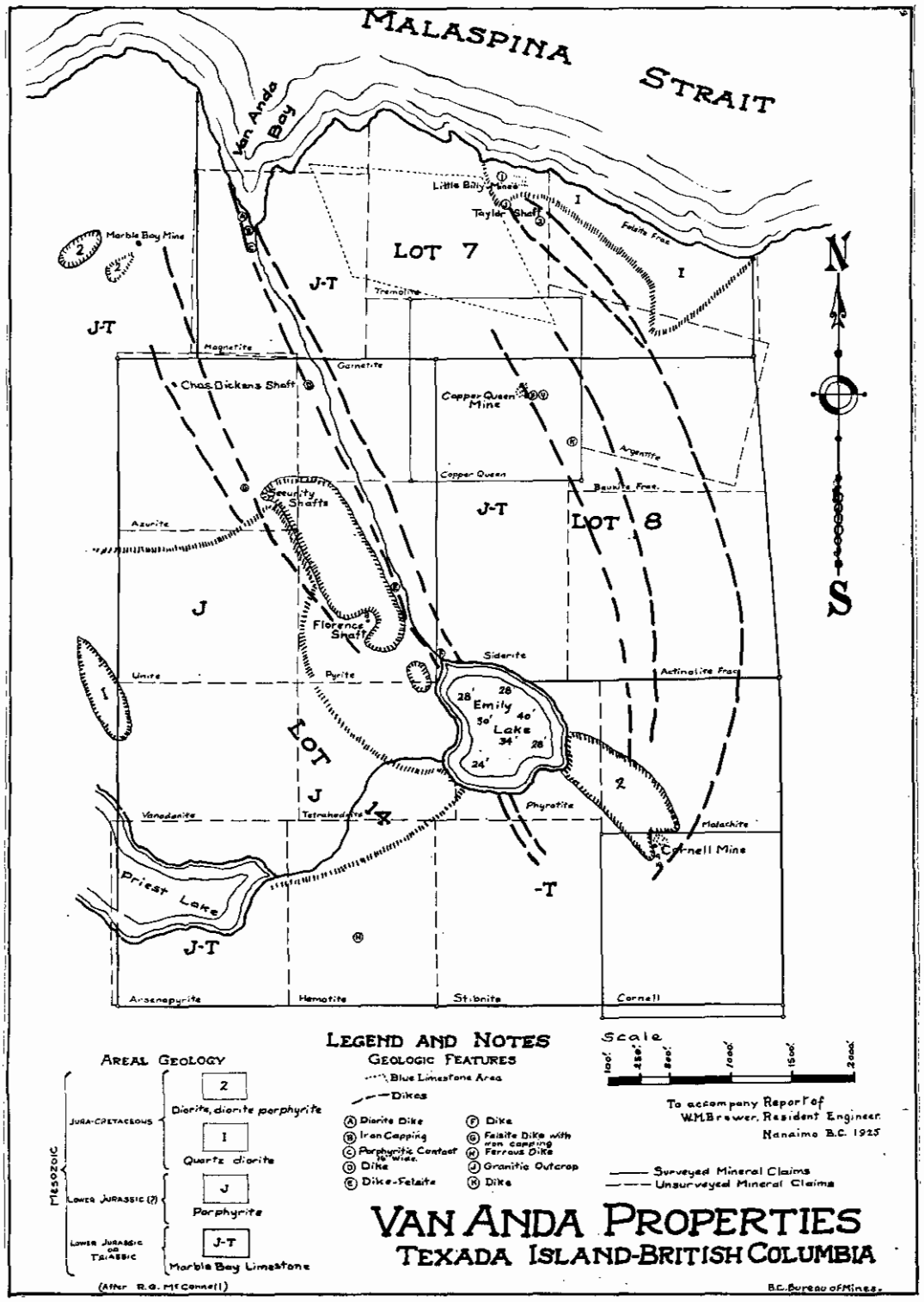
"*Mineralogy.*—All of the gold-copper ore deposits so far determined on these properties and in the immediate vicinity, as well as the magnetite-iron bodies, occur either in the contact between the igneous intrusions commonly called dykes or in the immediately adjacent crystallized



Outcrop on Julie Mine, Nanaimo M.D.



Ashlu Creek, Vancouver M.D.


MALASPINA STRAIT
Van Anda Bay
Little Billy Mines
Taylor Shaft
Felsite Frac.
Marble Bay Mine
LOT 7
J-T
Tremolite
Magnetite
Garnetite
Chas. Dickens Shaft
Copper Queen Mine
Argentite
Copper Queen
Bauxite Frac.
Security Shafts
Azurite
LOT 8
J
Florence Shaft
Siderite
Unite
Pyrite
Actinolite Frac.
Emily Lake
LOT 14
Vanadenite
Tetrahedrite
Phyrotite
Malachite
Cornell Mine
Priest Lake
-T
Arsenopyrite
Hematite
Stibnite
Cornell
N
S
LEGEND AND NOTES
GEOLOGIC FEATURES
Blue Limestone Area
Dikes
A Diorite Dike
B Iron Capping
C Porphyritic Contact 16" wide.
D Dike
E Dike-Felsite
F Dike
G Felsite Dike with iron capping
H Ferrous Dike
J Granitic Outcrop
K Dike
Scale
100' 250' 500' 1000' 1500' 2000'
To accompany Report of W.M. Brewer, Resident Engineer. Nanaimo B.C. 1925
Surveyed Mineral Claims
Unsurveyed Mineral Claims
AREAL GEOLOGY
MESOZOIC
JURA-CRETACEOUS
2 Diorite, diorite porphyrite
1 Quartz diorite
LOWER JURASSIC (?)
J Porphyrite
LOWER JURASSIC OR TRIASSIC
J-T Marble Bay Limestone
(After R.G. McConnell)
VAN ANDA PROPERTIES
TEXADA ISLAND-BRITISH COLUMBIA
B.C. Bureau of Mines.

lime areas. A grouping of these dykes has been made by the staff and is shown on map 'B' attached. A special study has been made of these dykes on the theory that they are of one basic origin and that the greater mineralization will follow the wider and more porous of the dykes. The igneous intrusions show mineralized zones of altered felsite and garnetite with contacts of limestone in which occurred areas of bornite and chalcopyrite. In some of the dykes occur diopside also showing copper sulphides. The higher gold values are found in the less porous and narrower dykes and are found in a gangue of garnet diopside and calcite, while the larger copper values are found in the wider and more porous dykes which have suffered more from erosion and are found in a gangue composed of felsite, tremolite, and calcite.

"*General Features.*—From historical data in hand and from this examination of the properties it developed, first, that the properties have been handled in the most unsystematic manner for the purposes of immediate recovery of ore in sight. However, these workings have developed the fact that high mineral values exist along the lines of each of the exposed dykes, and that along the lines of the more porous and wider of these dykes there is and should be larger mineralized areas of more perfect continuity, probably containing higher copper values and less of the precious metals. The reason that the smaller and more compact dykes are the ones that have been opened is due to the fact that they were and are more exposed, while the softer and wider dykes have been subjected to surface erosion and therefore are hidden from sight by an overburden of from a few inches to a few feet.

"*Conclusions.*—This property, both from its history and its present appearance, warrants a development. We submit this development should be preceded by careful exploitation of the known igneous dykes by diamond-drill holes systematically placed on the property and by drilling to a depth of 500 to 1,000 feet each. These drillings should be not less than ten in number. And we recommend that the central and eastern dykes, being the widest and most porous, receive the most careful exploitation.

"If, as we believe, these drillings will show large bodies of bornite and chalcopyrite ores, operations should be confined strictly to a mining operation of a permanent nature based on the smallest possible cost per ton of continuous production and an entire recovery of all possible values from each ton mined. All necessary power for mining, pumping, hoisting, crushing, and concentration should be developed at a central power-station located on Vananda bay, so that the fuel cost per ton could be brought to a minimum. Well-arranged development ahead of workings should be carried on at all times to the end that constant and permanent ore tonnage will be in sight. Every natural condition favours this development.

"Lime developments should accompany the mine's development.

"We are prepared to present detailed proposal for drilling locations and further details for the mine and milling plans and equipment specifications."

POWELL RIVER SECTION.

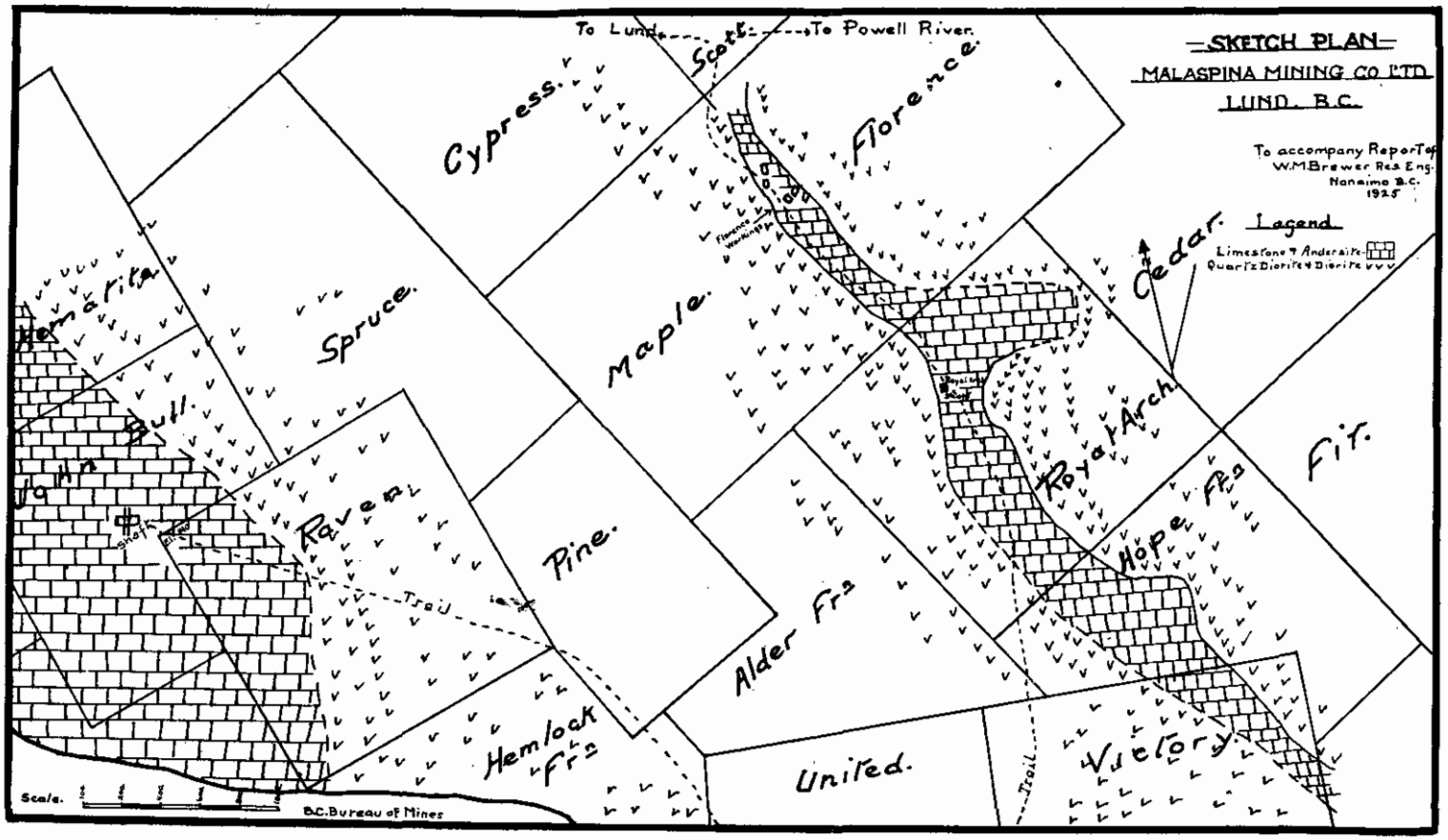
The Powell River section embraces the territory between Jervis inlet and Sarah point, the northerly end of Malaspina peninsula, along the coast-line of Malaspina strait, including the interior portion of the Mainland tributary to Powell lake and Theodosia arm.

The mining industry in this section has not progressed very rapidly in the past, one reason being the comparatively unexplored condition of that part of the Mainland lying north-westerly from Jervis inlet, taking in Powell lake and Theodosia arm. Another reason is the fact that where ore-bodies of any considerable extent have been discovered the principal value contained in the ore is zinc with which is associated more or less copper and a few ounces in silver to the ton. Until within the past two years the zinc content in such ore was so heavily penalized by the smelters that the ore was almost worthless.

During 1925 this section has experienced a revival because the rise in zinc prices has made these ore-deposits attractive enough to warrant bonding and systematic development of claims.

Malaspina Mines, Ltd.

This is a new corporation organized in 1925 which acquired the *Florence*, *John Bull*, and *Royal Arch* groups, situated near the shore of Malaspina strait, a short distance from Dinner rock and midway between Powell River and Lund. The *Florence* was fully described in the Annual Reports for 1917 and 1924; the *John Bull* in the Annual Reports for 1922 and 1924; and the *Royal Arch* in the Annual Report for 1924. Since then the properties have changed hands, so a more recent examination was made in order that the later operations now being carried on should be reported up to date.


SKETCH PLAN
MALASPINA MINING CO LTD
LUND, B.C.
To accompany Report of W.M.Brewer Res Eng. Nanaimo B.C. 1925
Legend
Limestone & Andersite
Quartz Diorite & Diorite
To Lund
To Powell River
Scott
Cypress
Florence
Cedar
Hematite
Spruce
Maple
Bull
John
Raven
Pine
Royal Arch
Fir
Hope Fr
Alder Fr
Hemlock Fr
United
Victory
Trail
Scale
B.C. Bureau of Mines

Geology.—Generally speaking, the geologic formations on the properties may be classified as similar to the "Texada" formation, which consists mostly of basic, massive, igneous rocks of varying composition and texture, but classed generally as porphyrites (McConnell, Memoir 58, Texada Island, Geological Survey, Canada) and associated granodiorite of the Coast range.

This so-called "Texada" formation occupies zones with a north-westerly strike nearly parallel with a belt made up of altered limestone, andesite, epidote, and garnet rock. This altered limestone-belt is well defined especially on the *Florence* and *Royal Arch*, where it varies in width from 100 to 300 feet, with occurrences of ore on both contacts. On the north-easterly and south-westerly sides of the limestone-belt granodiorite occurs. The altered limestone occupies a gulch or depression between granodiorite walls which apparently dip vertically.

Ore-deposits.—A prominent deposit of ore occurs on the *Florence* where a body of the contact-metamorphic type outcrops at several points along the line of strike for a distance of about 700 feet, and although stripping has not been continuous for that distance, yet quite a number of open-cuts have been made across the zones, some of considerable length, and from the general appearances of the conditions it would seem justifiable to consider that the ore maintains continuity throughout that distance on the surface.

The width of this ore-body has not been fully determined, but indications point to its being variable, with a maximum of 20 feet of milling-ore at one point, but what proportion of such ore is of sufficiently high grade to warrant direct smelter treatment instead of concentration has not yet been determined, although some grab samples taken have yielded as high as 39 per cent. in zinc.

The ore-deposits on the *Royal Arch* and *John Bull* occur under very similar conditions to the deposits on the *Florence*, as formerly described.

New Development-work.—Since the Malaspina Mines, Limited, began work on these claims the new work done by the company under J. E. Leckie, of Vancouver, the manager of the company, has been confined to extending the open-cut work formerly done; to preparations for sinking a main shaft on the *Florence* in one of the most promising outcroppings of ore; and to beginning a systematic course of diamond-drilling.

On the *John Bull* some of the old development-work has been cleared out and an open-cut which crosscuts a very promising deposit of ore extended with a view to locating the most favourable points for further development-work.

On the beach near the Powell River–Lund trail a camp has been established; a pipe-line 600 feet long has been laid from a creek to the camp; and the trails from the camp to the *John Bull*, *Royal Arch*, and *Florence* workings have been improved.

Ophir and Shamrock.—These claims have been described already in the Reports for 1917, 1921, and 1924. They are the oldest locations near the west shore-line of Powell lake, lying about 3 miles from its outlet. During 1925 prospecting has been continued, but the results have not changed the conditions materially.

Other Claims.—Prospecting has been done on several other claims that were staked and recorded during 1925 in this section of the Nanaimo Mining Division, but the work has been practically confined to surface prospecting in search of outcroppings of ore-bodies.

NEW WESTMINSTER MINING DIVISION.

The New Westminster Mining Division is the smallest in area in the Western Mineral Survey District (No. 6). A large part of this Division is covered by the Fraser and Chilliwack valleys, while the remainder is quite mountainous, especially that part drained by the Chilliwack river and in the vicinity of Chilliwack lake.

The northerly part of the Division, drained by Harrison lake and river, Stave lake and river, and Pitt lake and river, has been prospected to some extent, but although there were about 200 claims in good standing at the end of 1925, none of them is yet producing.

Many of the prospects which have been examined during the last eight years might possibly develop into shipping-mines, but for the most part these are held by the original locators, who are unable because of lack of funds to carry on development-work; while others with promise are handicapped by lack of transportation facilities.

The transportation problem in the northerly part of the New Westminster Mining Division is a difficult one owing to the precipitous mountain-slopes and the fact that although the Harrison, Stave, and Pitt lakes are all navigable, the rivers that flow in at the heads of these lakes are not navigable, except for a canoe or small boat in a few cases.

Chiefly on account of this difficulty the progress of the metal-mining industry in the New Westminster Division has been retarded. There are quite a number of mineral claims which possess sufficient merit to warrant the expenditure of capital to develop them into producing mines, but the transportation problem has handicapped all endeavours to raise capital.

Another reason for lack of progress is that practically all the lode claims contain only deposits of copper ore with low values in gold and silver, and usually do not indicate any very extensive ore-bodies.

In October, 1925, the writer examined several prospects a few miles from Mission and others on the Harrison river between the south end of Harrison lake and the confluence of that river with the Fraser, but no particular mention is made of them in this report, because the ore-bodies appear to be of very limited extent and the samples taken indicated that the values carried by the ore were too low to warrant any expenditure on further development-work.

There is one attractive feature with regard to this Division, and this is the fact that the easterly boundary of the Coast Range granodiorite batholith practically conforms with the easterly boundary of the Division. It is along that contact between the granodiorite and the old altered sedimentaries that the *Dolly Varden* ore-body, carrying in places quite high silver values, occurs. Along this contact is one of the most attractive fields in the Province for prospectors by reason of the high prices for silver-lead-zinc ores at the present time.

Dolly Varden Group.

Early in 1925 it was expected that the wagon-road from Chilliwack to the foot of Chilliwack lake would be reconstructed and placed in such a condition that shipments of ore could be made from the *Dolly Varden*, owned by the Silver Chief Mining Company, situated near the head of Chilliwack lake. The property was described in detail in the Report for 1923 and was not examined during 1925. The reconstruction of the road proved to be a greater undertaking than was expected and consequently the owners of the *Dolly Varden* group have been kept busy in assisting in this work, which was necessary before they could either haul ore out or machinery in. The result has been that shipment of ore and development of the property have both been delayed. The road has now been finished and it is expected that during the coming season development of the mine will be considerably extended and shipments of ore made to the smelter.

Lucky Four Group.

A description in detail of this group of claims was made after an examination in 1918 and published in the Report for that year. Since that time the owners have done no considerable development-work, but have been negotiating for the sale of the property. It has been recently reported on reliable authority that a bond has been entered into by one of the largest copper-mining companies in the United States to commence systematic development-work during 1926.

Viking Group.

This property, owned by the Pitt Mining Company, Limited, and situated near the outlet of Pitt lake on the easterly side, was described in the Report for 1923. During 1925 some work has been done for the purpose of placing the mine in such condition that shipments could be made. The installation of the necessary equipment was not completed during the past season, and although the writer has made several attempts to get in touch with W. H. Wooly, the managing director, to arrange to make a further examination, he has been unsuccessful, but understands from reliable authority that there is no very material change in the conditions from those described in the report already referred to.

The difficulty of obtaining sufficient funds to carry on the necessary development-work and fully equip the mine with machinery, concentrator, and aerial tramway has, it is claimed, been responsible for the delay since 1923.

As the mine-workings show that there is quite a considerable tonnage of ore of commercial grade available for immediate shipment when stopes are opened, it is to be hoped that the financial difficulties will be overcome early in the coming season.

VANCOUVER MINING DIVISION.

The northerly part of the Division—that is, between latitude 50° and 51°—is practically unexplored, but the southerly part has been prospected more or less thoroughly ever since 1897 or since the discovery of the Britannia mineral-belt.

Until three or four years ago prospecting in this section was practically confined to the vicinity of the shores of Howe sound, the line of the Pacific Great Eastern, and the watershed of the Indian and Stawamus rivers. The former flows into the Indian arm and the latter into

the head of Howe sound. Bowen island and portions of the mountains adjacent to Jervis and Sechelt inlets have also received considerable attention from prospectors.

During 1925 more intensive prospecting was done in the section east from Squamish, along the southern part of the Pacific Great Eastern Railway, and along the upper Squamish river than in the past. This resulted in the staking and recording of about eighty claims, thirty-five of which are located on Raffuse creek, a tributary of the Mamquam river, about 10 miles easterly from Squamish.

One reason for Raffuse creek receiving so much attention was discovery by Messrs. McVicar and Brown and O. W. Raffuse of high-grade copper-sulphide ores in a geologic formation very similar to that in the Britannia mineral-belt.

These outcroppings were so promising that the Britannia Mining and Smelting Company bonded a number of claims recorded by McVicar and Brown. Late in the fall of 1925 the Britannia Mining and Smelting Company diamond-drilled these prospects, but later decided to relinquish their option.

Fred Pykett and associates were engaged during the greater part of the summer doing assessment-work on the *Golden King* on Ashloo creek and prospecting the new territory on the summit between the head of Ashloo creek and Jervis inlet. The results from this prospecting have not been yet reported.

Britannia Mining and Smelting Co.

The operations of this company, the history of the mine, the geology, and general features with regard to mining and milling have been described in the Annual Reports since 1917, particularly in 1924, where the description was made as comprehensive as possible. The following is a short description of the operations during 1925, which was furnished by C. P. Browning, the general manager. The report on the mine operation has been prepared by J. I. Moore, Jr., mine superintendent, and that on the mill operation by A. C. Munro, mill superintendent.

Jane.—No work was done in the *Jane* other than prospecting for extensions in depth, which did not prove additional ore.

Bluff.—The *Bluff* yielded a steady production. Development on all levels in the *Bluff* was carried forward, with the result that new ore was exposed, particularly on the 2,000- and 2,200-foot levels. An estimate of this new ore is not available at this time, although it looks as if we may be able to add something over 200,000 tons to our ore reserves in this mine.

Empress.—The *Empress* was worked only five months of the year. Development-work in this mine was carried forward between the 1,200- and 1,600-foot levels with encouraging results, so that we may expect to add some positive ore to our *Empress* reserves, although at this time it is not possible to furnish a definite figure.

Victoria.—Production from the *Victoria* has been steady throughout the year. Heavy ground conditions have been encountered in the upper levels of this mine, necessitating a large amount of timbering. The important piece of development-work accomplished during the year was the sinking of the No. 2 shaft below the 2,200-foot level and the subsequent development of the 2,350-foot level. Results to date are very encouraging, showing the veins to be equally as strong as developed on the upper levels.

Fairwest.—The *Fairwest* camp was established during the year and sinking on the ore is going forward. The shaft is down about 100 feet, showing heavy mineralization, and it is planned to cut a level at 150 feet depth and prospect farther before continuing the sinking operations.

Development Summary.—The following table is for the eleven months to December 1st, 1925:—

Mine.	Drifts.	Crosscuts.	Raises.	Winzes.	Stopes.	Total.
	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.
Jane	37	341	197	.....	.....	575
Bluff	1,940	563	435	.....	446	3,384
Fairview	694	471	585	82	673	2,505
Empress	216	41	298	.....	419	974
Victoria	1,874	748	434	188	666	3,910
Robinson	268	181	.....	.....	.....	449
Fairwest	163	3	21	91	.....	278
Totals	5,192	2,348	1,970	361	2,204	12,075

Above will be increased by about 1,000 feet in December; year's estimate, therefore, is 13,000 feet.

The deepest levels on which ore has been developed in the mines are as follows: *Jane*, 1,000-foot level; *Bluff*, 2,200-foot level; *Fairview*, 1,600-foot level; *Empress*, 1,600-foot level; *Victoria*, 2,350-foot level.

Stoping-ground has been opened on the various levels above those mentioned in the preceding paragraph, and we estimate the ore broken during 1925 as follows:—

Mine.	December 1st.	December Estimate.	Total Estimate.
	Tons.	Tons.	Tons.
Bluff	271,316	25,000	296,000
Fairview	129,832	15,000	144,000
Empress	8,449	3,000	11,000
Victoria	149,317	15,000	164,000
Totals	558,914	58,000	615,000

Tonnage of ore extracted is as follows:—

Mine.	December 1st.	December Estimate.	Total Estimate.
	Tons.	Tons.	Tons.
Bluff	212,078	17,000	229,000
Fairview	535,129	54,000	590,000
Empress	9,964	2,700	12,500
Victoria	149,317	15,000	164,000
Totals	906,488	88,700	995,500

NOTE.—The above figures do not include ore extracted in development.

The tonnage of ore remaining in stopes as broken reserve will approximate 1,200,000 tons on January 1st, 1926.

The tonnage of ore in sight in each mine—that is, actual or positive ore—is as follows:—

	Tons.
Jane	96,000
Bluff	1,000,000
Fairview	2,150,000
Empress	300,000
Victoria	550,000
Total	4,096,000

NOTE.—We do not publish figures of probable or possible ore and above figures embrace only positive ore.

Important features relating to ore-bodies exposed by development-work will be noted as follows:—

Bluff.—Extensive development-work to the west of the *Bluff* as well as in depth has shown gratifying results and indications point to a possible large tonnage of fairly good-grade ore. Prospecting in depth below the 2,200-foot level is being carried forward, present indications pointing toward the probability of this deposit extending considerably below the 2,200-foot level.

Victoria.—Development-work on the 2,350-foot level has been confined to two veins only up to the present time, both of which have been found to be of as good grade and width as exposed on the 2,200-foot level. The diamond-drill is being used at present to aid in the development on this level and it is expected that January 1st will show the work fairly well completed. With the opening-up of the 2,350-foot level it is expected that additional positive ore reserves will be equal to, if not greater than, the ore extracted during 1925.

Fairwest.—As a result of surface prospecting, together with diamond-drilling, a potential ore-body was located at the *Fairwest*, some 6,000 feet east of the *Victoria*. A 2-compartment shaft is being sunk from the *Fairwest* tunnel with encouraging results as to possible ore. It is

planned to sink this shaft to a depth of 150 feet and then prospect the deposit thoroughly before continuing to sink.

The only surface improvements have been the construction of a 40- by 80-foot gymnasium building at the mine townsite and the construction of bunk-houses, compressor plant, and shops at the *Fairwest* camp. There have been no important or unusual conditions with regard to labour.

The total tonnage shipped from the mine to the mill was 1,032,596 tons. The tonnage of ore drawn from the broken reserves left in the mine as at January 1st, 1925, is estimated at 365,000.

The approximate grade of the ore mined and milled can best be obtained from the milling figures at the beach. The grade of the ore as drawn from the mine has shown slightly higher than the actual mill-heads.

Important changes in the mine staff during the year were the resignation of H. L. Batten as assistant mine superintendent, who was succeeded by C. V. Brennan, who had formerly been in charge of the *Victoria* mine, and the indefinite absence of T. McCulla, mine foreman, due to ill-health, whose place has been taken by J. Sleeman.

During the latter part of the summer the company took an option on a group of claims owned by McVicar and Brown, located on Raffuse creek, some 10 miles easterly from Squamish, but after completing a programme of prospecting it was decided to relinquish the option.

Other examinations have been made of promising prospects which were not taken up.

Mill.—No major changes have been made during the year in the ore-transportation system from the mine to the mill-bins. The system functioned very satisfactorily, the transportation cost of ore delivered to the mill-bins averaging 10 cents a ton.

Milling operations were conducted without interruption throughout the year, except that during the second and third quarters the tonnage was slightly reduced in order to somewhat curtail copper production, due to the low price of this metal then prevailing.

The flow-sheet and general milling practice of the *Britannia* mill is practically the same at the close of 1925 as that outlined in the report for the previous year. Such changes as have been made with a view towards improving metallurgical efficiency have been chiefly in the application of oils and reagents.

In effecting the differential separation of the chalcopyrite and pyrite in the flotation process the use of hydrated lime to prevent the pyrite from floating has been continued. Other reagents for this purpose, notably sodium cyanide, have been experimented with, but results attained so far have not been as good as those with lime. The lime is added to the fine-grinding mills in an amount equivalent to approximately 1.5 lb. to the ton of ore treated.

During the greater part of the year the oils used to float the copper mineral consisted of a primary or collecting mixture of coal-tar and hardwood-creosote, which is added to the ore at the grinding-mills, together with steam-distilled pine-oil as a frother, this latter oil being added just ahead of the flotation-machine. Extensive experimental work, both large and small scale, has been carried out on the use of potassium xanthate in conjunction with pine-oil. At the close of the year the entire mill is being operated on this combination of reagents, and judging from the results now available it seems probable that the coal-tar and other heavy oils previously used may be permanently replaced by the xanthate, with a consequent improvement in metallurgical results.

One of the chief problems at the present time arises from the fact that a considerable proportion of the ore being treated was broken in the mine during the shut-down period of 1920–22. This ore has thus lain in the stopes for a number of years, exposed to air and water, and has consequently become considerably oxidized. Due to this oxidization, recovery of the copper mineral is impaired not only on the old stope ore itself, but on the clean freshly broken ore with which it is mixed in transit from the mine to the mill.

An effort was made to improve general recovery by segregating, as far as possible, the oxidized portion of the ore from the freshly broken and milling the two separately, but the difficulties attendant on handling two classes of ore over a transportation system consisting in part of raises were so numerous that the scheme had to be abandoned. At the present time segregation is effected of the primary slimes and soluble salts after the ore reaches the mill, and the segregated portion is given special flotation treatment, and at the same time contamination in the flotation-machines of the major parts of the ore by the injurious slimes and soluble salts is avoided. This has been an important step forward toward improvement in recovery.

On the whole, metallurgical results achieved by the present *Britannia* mill under present conditions may be considered very satisfactory, but the mill recovery will be considerably improved after the old stope ores have been extracted and milled.

The mill, originally designed to handle about 2,300 tons a day, has treated during the past year an average of over 2,750 tons a milling-day, and during the latter part of the year between 2,900 and 3,000 tons a day.

Following is a summary of general milling and metallurgical data for the year 1925, compared with that for the previous year:—

	1925.	1924.
Wet (3 per cent. moisture) tons transported, mine to mill	1,032,596	866,053
Dry tons milled	994,113	843,987
Average grade of ore, per cent. Cu	1.65	1.77
Dry tons concentrates produced	71,755	63,447
Ratio of concentration	14.00	13.30
Pounds of copper produced	28,002,658	26,398,539
Ounces of gold produced	8,231	4,684
Ounces of silver produced	138,076	125,687
Copper recovery, per cent.	88.00	88.75
Gold recovery, per cent.	61.00	53.00
Silver recovery, per cent.	75.00	73.00
Per cent. moisture in concentrates shipped	10.30	10.60

Average analysis of *Britannia* concentrates, 1925:—

Copper, per cent.	20.50
Iron, per cent.	27.50
Zinc, per cent.	6.10
Insoluble, per cent.	8.20
Sulphur, per cent.	34.50
Gold, oz.	0.12
Silver, oz.	2.00

The total milling cost, including primary crushing at the mine and Minerals Separation royalty, averaged 51 cents a ton. The direct cost, excluding these two items, averaged 40 cents a ton. These figures compare with 53 cents and 42 cents for the year 1924.

During the year forty shipments of concentrates were made by steamers to the Tacoma smelter, in lots of from 1,500 to 2,500 tons each, reaching a total of approximately 78,000 wet tons shipped during the year.

There have been no changes in the milling staff and labour conditions have been remarkably good during the year of 1925.

In the interest of community welfare a gymnasium was built early in the year at the Beach camp. This building is 80 by 40 feet and has hardwood floors, a balcony, and dressing-rooms.

General.—During the year a double-circuit power-line on wood poles approximately 3½ miles long was built to replace an existing line running from the beach power-house to the tunnel power-house. The line will carry the same voltage as the old line—namely, 6,600 volts. This construction was found necessary on account of the old line having become overloaded.

A concrete building adjoining the beach power-house was built to house switching and other equipment. New switching equipment was also bought and is being installed in this building in connection with the new power-line.

We added one 6-ton electric locomotive and three 20-ton cars to our haulage equipment. Machine-shop equipment was added to by the purchase of two lathes, one for the beach and the other for the mine-shop. An electric hoist was purchased and installed at our Victoria camp.

Total expenditure for construction and equipment will amount to approximately $160,000.

No dividend was declared during the year. One disbursement of 50 cents per share, however, was made by the parent company, Howe Sound Company.

SQUAMISH SECTION.

This section includes the territory easterly from Squamish and embraces the watersheds of the Stawamus and Mamquam rivers and the watershed at the head of the Indian river.

For several years past this section has been the scene of very considerable prospecting which was done by a few old-time prospectors, principally by J. H. McVicar, John W. Brown, O. W. Raffuse, D. A. McKinnon, Duncan McKinnon, Donald McCallum, and S. A. Habrich. The area covered by these prospectors extends from Squamish up the Stawamus river to the head of Indian river, including Ray creek, and from Squamish up the Mamquam river, including the watershed of Goat creek, one of its tributaries.

How closely this section has been prospected may be judged from the fact that there are about eighty claims staked and in good standing.

Goat Creek Group. This group contains thirty-four claims staked by McVicar and Brown during 1924 and 1925. This group is located on the watersheds of Raffuse and McVicar creeks, the last named being a tributary of Raffuse, and at a distance of 10 miles from Squamish by pack-trail up the Mamquam. The mine camp is at an elevation of about 3,200 feet above sea-level.

The trail up the Mamquam river was constructed some years ago, but from the point where the trail up Goat creek branches off about 5 miles from the mine camp was constructed with Government assistance during the fall of 1924 and the spring and summer of 1925.

During the fall of 1925 this trail was used to transport a diamond-drilling outfit from Squamish to the mine camp and for packing on horses all the necessary supplies and equipment for a camp of about ten men, who were engaged in diamond-drilling by the Britannia Mining and Smelting Company in compliance with an agreement between that company and McVicar and Brown.

Geology.—The Goat Creek group of claims was examined by the writer in September, 1925, when the diamond-drilling was being done. The country-rock is made up almost entirely of green schists and altered volcanics which belong to an undestroyed roof-pendant in the Coast Range granodiorite batholith.

The geologic series is somewhat similar to the formation of the Britannia mineral-belt, but the sills designated by J. S. Schofield in the Summary Report for 1918, Part B, pages 56 to 60B, as the "Britannia sills" appear to be lacking, according to H. A. Rose, the geologist for the Britannia Mining and Smelting Company. Schofield in his report places so much importance on these sills that he states as follows: "These sills are economically the most important members of the rocks exposed at Britannia, since the ore-bodies occur as impregnations in the quartz-sericite schist which is a sheared porphyrite."

Ore-deposits.—Outcroppings of ore-bodies occur on the Goat Creek group at elevations of from 3,700 to 4,700 feet above the sea-level, with the most noticeable outcroppings on the *Rainstorm* and *Harding*. On the *Rainstorm* outcroppings of chalcopyrite associated with some pyrrhotite, pyrite, and bornite are exposed at various points along the strike of the formation for about 800 feet. Many of the exposures contain ore of good grade, but they are not continuous, and suggest a series of lenses with the most important outcrop consisting of two or three veins or concentrations of ore in the schist shear-zone and traceable for over 200 feet on the surface, varying in width from 4 to 9 feet.

Development-work.—Several diamond-drill holes were being bored to test the depth to which the ore-bodies maintained continuity, most of them from points near McVicar creek, which flows across the *Rainstorm* and *Harding*.

Sampling.—No samples were taken during the examination referred to for the reason that merely sampling the outcroppings would be unsatisfactory unless the diamond-drill cores also were sampled. These were not all obtainable at the time of the examination, for most had been sent to the Britannia assay office for analysis and the returns were not available.

Raffuse Group. This group is situated on the easterly side of Raffuse creek, nearly opposite the Goat Creek group just described. The group has not yet been examined as many of the claims were only recently staked and Raffuse and associates are arranging to do further prospecting and some development-work as soon as a pack-horse trail can be constructed and a camp established at the most desirable point for the work to be done.

Other Claims.—In the Squamish section of the Vancouver Mining Division there are several other groups of claims which have been described in earlier Annual Reports, as follows: *Belle*, Report, 1913, pages 246 and 247; *Bruce*, Report, 1919, pages 229 and 230, and 1921, pages 229 and 230; *McKinnon*, Report, 1919, page 230; *Radiant*, Report, 1921, pages 229 and 230.

ASHLOO CREEK SECTION.

Between October 1st and 6th the writer visited this section, which is situated on Ashloo creek, a tributary of the upper Squamish river, distant about 30 miles north-westerly from Squamish.

Ashloo creek had not been prospected until 1923, when Fred Pykett and associates made an exploratory trip and, discovering gold-bearing ore, some of which carried quite high values in gold and silver, located a group of eight claims.

The section is in the heart of the Coast range, very mountainous, peaks attaining 6,000 to 8,000 feet elevation, and Ashloo creek flows through deep box canyons, so deep that a bridge across the creek is between 60 and 70 feet above the normal level of the water. The banks of the creek are quite precipitous where they do not form narrow box canyons and there are no valleys on either side. In fact, this characteristic is so pronounced that it is practically impossible to construct a trail that would follow the course of the creek, and the trail, from near the confluence of Ashloo creek and the upper Squamish river, had to be constructed some distance back in the mountains through natural passes that were found by Pykett and his partners.

Since then Pykett and partners have continued their exploratory work to the summit between the head of Ashloo creek and Jervis inlet, where there occur large glaciers. Prospecting is attended with many difficulties, especially from snow and rock slides during the spring months. The grade of the ore discovered by Pykett is such that the section ought to prove an attractive one for prospectors.

Golden King Group.

This group consists of the *Derby*, *Devonian*, *Fonk*, *Petro*, *Grandview*, *Highlander*, *Robbie Burns*, and *Golden Coin*, owned by Fred Pykett, Dorothy Foot, Alice Maud Pykett, Christian Anderson, Nellie Olson, and Lars L. Grebsted, residents of the upper Squamish River valley. The *Golden King* is located on Ashloo creek about 10 miles from its mouth.

Geology.—The country-rock is for the most part igneous, resembling diorite, in which occur many shear-zones with the shearing very pronounced and almost sufficient in some places to give the rock a schistose structure. Several intrusive dykes which are very persistent occur cutting the country-rock at various angles, and one in particular which parallels the strike of the ore-body can be traced for a long distance and probably has had much influence in the formation of the ore-zone.

Ore-deposits.—The ore-deposit occurs as a well-defined quartz vein filling a fissure in the shear-zone of the igneous rock. The walls of this fissure are quite well defined, with several inches of gouge on each between the vein material and the walls. The strike of this vein is approximately N. 20° W. (mag.). The dip of the vein is from 18° to 35° S.W.

The vein-filler is chiefly quartz mineralized with pyrrhotite, iron pyrite, and some chalcopyrite, but in places in the vein there occur intrusive tongues, wedge-shaped, of igneous dyke rock which form lenses in the quartz vein.

Most of the quartz has a banded or ribbon structure and the vein shows the best development on the *Golden Coin* and *Derby*, on which claims practically all the prospecting-work has been done.

Development-work.—On the *Golden Coin* there is an adit 102 feet long on the strike of the vein, which is approached by an open-cut 30 feet long, 9 feet high, and 9 feet wide through solid rock. At one point in the adit an upraise has been made 33 feet high following the vein.

In addition to the adit on the *Golden Coin* there are several open-cuts, the most important being about 300 feet higher elevation on Anderson creek, a tributary of Ashloo creek. This open-cut is about 100 feet long, but had caved in so much that an examination could not be well made.

On the *Derby*, which adjoins the *Golden Coin* on the north-west corner at a point about 1,000 feet from the adit on the *Golden Coin*, the same vein apparently occurs. It can be found at intervals along the strike. An adit 25 feet long has been drifted on the vein, which at this point averages about 3 feet 6 inches wide and dips at an angle of about 20° S.W.

Between the work on the *Golden Coin* and that on the *Derby* two creeks form a confluence—the main Ashloo creek, which flows past the adit on the *Golden Coin*, the portal of which is about 100 feet above the creek, and a creek known as Pykett creek, which flows through the *Fonk* and *Derby* into Ashloo creek about 1,000 feet northerly from the adit on the *Golden Coin*.

Between these two workings it is practically impossible to prospect the vein owing to the creeks, but at one point about 100 feet down Ashloo creek from the *Golden Coin* adit stripping has been done.

In addition to the development-work already mentioned, there is on the *Derby* claim, about 600 feet up the creek from the adit referred to, stripping and open-cut surface work about 50 feet long.

One piece of development-work that deserves special mention is the home-made truss bridge built by Pykett across Ashloo creek near the adit on the *Golden Coin*. This bridge spans a box canyon between 60 and 70 feet deep.

At the camp near the junction of the *Golden Coin* and *Derby* an excellent cabin has been erected large enough to accommodate ten men.

The pack-horse trail from the upper Squamish river is an excellent piece of work and was, in October, some 6½ miles long. The remaining 3½ miles has heavy rock-work and construction around rock bluffs on side-hills which had to be cribbed, so is not yet completed. Pykett expected to have the trail in such shape as to permit taking pack-horses all the way from the upper Squamish river to the mine camp early in 1926.

Sampling.—Six samples were taken during my examination, which were assayed at the Bureau of Mines, with the following results:—

Sample No. 1, from across 2 feet 5 inches in the face of the drift on the *Golden Coin*, assayed: Gold, 0.50 oz.; silver, 1 oz. to the ton; copper, *nil*.

Sample No. 2, across 2 feet 5 inches on the hanging-wall side 6 feet from the face of the drift where sample No. 1 was taken, assayed: Gold, 2.9 oz.; silver, 2 oz. to the ton; copper, *nil*.

Sample No. 3, from top of raise in drift on *Golden Coin* across 3 feet 4 inches, assayed: Gold, 0.02 oz.; silver, 0.2 oz. to the ton; copper, *nil*.

Sample No. 4, across 18 inches in drift on *Golden Coin* at a point 57 feet from the face of the drift, assayed: Gold, 0.04 oz.; silver, 0.4 oz. to the ton; copper, *nil*.

Sample No. 5, from the *Derby* across 3 feet 6 inches face of drift adit, assayed: Gold, *nil;* silver, *nil;* copper, *nil*.

Sample No. 6, from the *Derby* across 1 foot 10 inches from near the portal of the adit from which sample No. 5 was taken, assayed: Gold, 2.4 oz.; silver, 6.6 oz. to the ton; copper, trace.

In the report on this group in the Annual Report for 1924, page 242, the assays resulting from twenty-two samples taken systematically by a reliable mining engineer are published.

BREW OR BRANDYWINE RIVER SECTION.

Blue Jack Group. In the Annual Report for 1924, pages 243 and 244, this group is fully described. The following describes the work done during 1925: An adit has been started on the 75-foot level under the main outcrop on the *Blue Jack No. 1*. This has been driven 25 feet. A trail has been constructed from McGuire, on the Pacific Great Eastern Railway, to the *Blue Jack No. 1* and a camp and blacksmith-shop built near the mine-workings.

Brandywine Group. On the south side of the Brandywine creek, about 2 miles west of Brew (Brandywine Station), on the Pacific Great Eastern, a group of eight claims was located about three years ago by Byington, Barkley, Anderson, and McKenzie. This was not examined in 1924 at the time the *Blue Jack* group was visited, but during September last the *Brandywine* group was visited and some samples taken.

The station on the Pacific Great Eastern is at the crossing of the Brandywine river close to Brandywine falls, at an elevation of 1,650 feet above sea-level. The camp on the mineral claims is some 300 feet higher. This camp is on the north side of the Brandywine river about 2 miles from the falls, but the outcroppings are on the south side of the river. The outcroppings consist of schistose or sheared bands of rock impregnated with zinc-blende and galena, with a strike of S. 55° E. On the main outcropping a crosscut adit has been run just above the creek-level and driven 66 feet toward the mineral-bearing zone. This adit has already crosscut some bunches of ore, from which a sample was taken.

At a slight elevation above the crosscut adit and west of it outcroppings of the same character of ore occur at intervals over a distance of half a mile, three of these being prominent. The one nearest the adit is at an elevation of 2,200 feet and on this no work has been done.

The next is at an elevation of 2,300 feet and has been opened up by an open-cut crosscutting the zone for a width of 30 feet. This crosscut exposed zinc-blende and galena ores disseminated through a portion of the cut and also some narrow veins mineralized by the same ores.

The third is at an elevation of 2,150 feet about half a mile west of the crosscut adit. Here the zone has been stripped 20 feet wide, but owing to the rotten state of the surface outcropping, and as no work had been done, a sample could only be taken from across 6 feet.

Three other open-cuts have been made at higher elevations farther to the south-west. In each of these outcroppings similar conditions occur, but the work done on them has been quite limited.

Samples.—From selected ore in the main crosscut adit a sample was taken which assayed: Gold, 0.04 oz.; silver, 2.62 oz. to the ton.

A sample from the outcrop on the 2,200-foot elevation assayed: Gold, trace; silver, 0.42 oz. to the ton.

A sample from the outcrop on the 2,300-foot elevation assayed: Gold, trace; silver, 0.36 oz. to the ton.

A sample from the outcrop on the 2,150-foot elevation assayed: Gold, trace; silver, 0.6 oz. to the ton.

Another sample from the outcrop on the 2,150-foot elevation assayed: Gold, trace; silver, 0.4 oz. to the ton; lead, 0.5 per cent.; zinc, 3.2 per cent.

A second sample from the crosscut adit assayed: Gold, trace; silver, 3 oz. to the ton; lead, 2.5 per cent.; zinc, 5.3 per cent.

A third sample taken from the crosscut adit from selected ore assayed: Gold, trace; silver, 2.2 oz. to the ton; lead, 3.5 per cent.; zinc, 17 per cent.

Astra Group. Northerly from the *Blue Jack* on the ridge between the Brandywine river and the Callaghan creek, the *Astra* group, consisting of six claims, known as the *Astra*, *Alfred*, *Robert*, *Stewart*, *Royal Oak*, and *Avenue*, is located. The owners are B. A. Falconer, of 165 Pender Street West, Vancouver, and associates. The only work done on this group is surface prospecting consisting of trenching and open-cutting, in which ore is exposed to a depth of about 15 feet.

Samples taken from this open-cut work on the *Robert* assayed as follows:—

No. 1, across the width of 1 foot on the hanging-wall side, assayed: Gold, trace; silver, 3.2 oz. to the ton; lead, 19.2 per cent.; zinc, 8.5 per cent.

No. 2, across 1 foot taken next to No. 1, assayed: Gold, trace; silver, 1.8 oz. to the ton; lead, 9.5 per cent.; zinc, 5 per cent.

No. 3, from the same open-cut, selected ore, assayed: Gold, 0.16 oz.; silver, 4.5 oz. to the ton; lead, 21.5 per cent.; zinc, 11.2 per cent.

Eleanor Group. This group consists of the *Eleanor*, *Ruth*, *Francis*, *Kate*, *Ropo*, *Prexo*, and *Hughy*, located southerly from the *Brandywine* group near the summit of a high ridge. The *Eleanor* group is owned by B. A. Falconer, of Vancouver, and partners. As the group was only staked in June last, there had been but little opportunity to thoroughly prospect it during last season.

Two samples furnished by B. A. Falconer taken from outcroppings on the *Eleanor* assayed as follows:—

No. 1: Gold, trace; silver, 0.6 oz. to the ton; lead, 0.5 per cent.; zinc, 1 per cent.

No. 2: Gold, trace; silver, 0.6 oz. to the ton; lead, 4.5 per cent.; zinc, 1.5 per cent.

The conclusions drawn after the examination of the Brandywine River section are that it is an excellent prospecting-ground on which systematic prospecting will result in the exposing of ore-bodies carrying commercial values in silver, lead, and zinc.

The area immediately adjacent to the *Brandywine*, *Blue Jack*, *Astra*, and other groups, which extend from immediately south of the Brandywine river to the summit of a high ridge north of the river and down the slope to the Callaghan creek, is 5 miles long by a mile wide. Attention was first called to the section by Charles Camsell in his report of "Reconnaissance from Squamish to Lillooet," published in the Summary Report, Geological Survey, Canada, 1917, Part B, page 12.

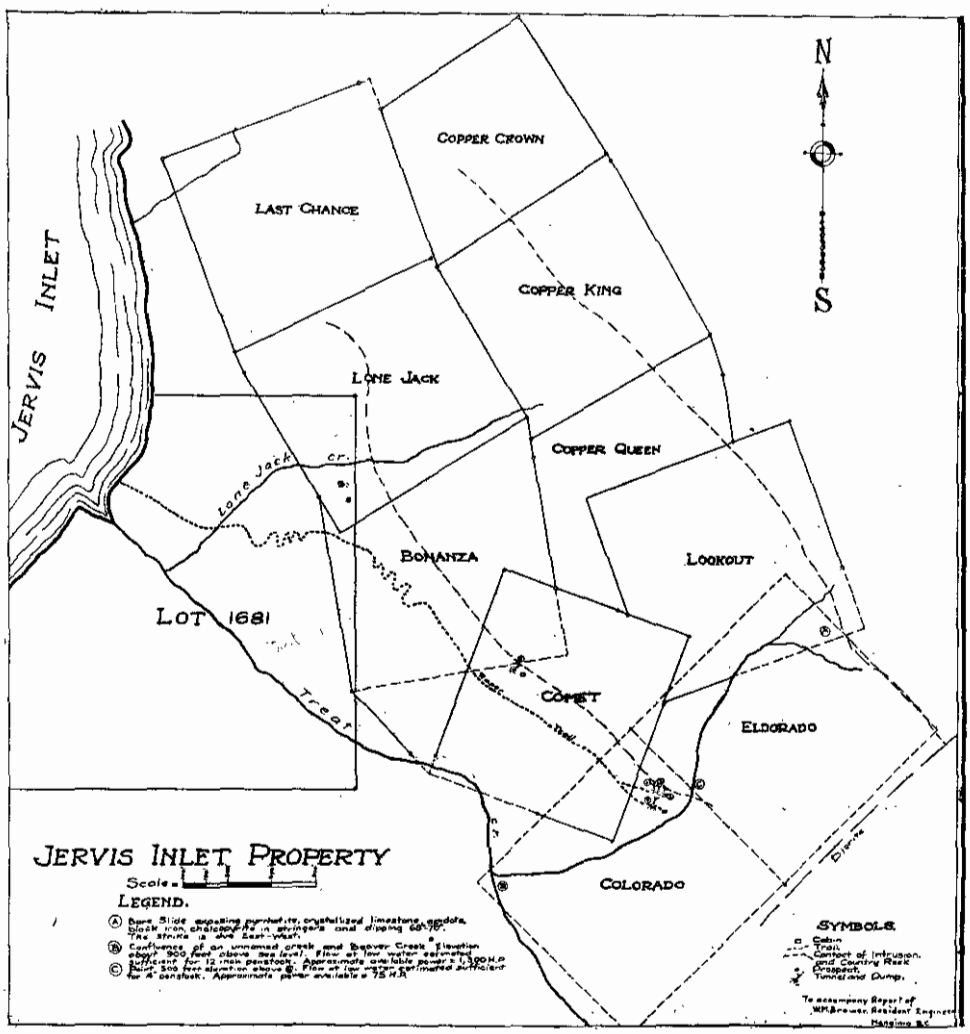
In this report, referring to the Brandywine river or Brew section, Camsell states as follows: "A band of sedimentary rocks at this point composed of conglomerates, sandstone, schist, and limestone is intruded on the west by a sheared granodiorite and on the south and east passes underneath basalt surface flows," which rocks he places in the Jura-Triassic period of the Mesozoic era.

JERVIS INLET SECTION.

This section of the Vancouver Mining Division was visited by the writer for about a week during the season of 1925 in order to ascertain what work had been done on the various claims since his last visit in 1924. This was found to consist of assessment-work and some surface prospecting by a few prospectors who make their headquarters in the neighbourhood of Egmont point; Hotham sound; Britain river; and near the head of Jervis inlet.

Copper Group.

The most important group of claims in the Jervis Inlet section, so far as has been proven to the present, is the *Copper*, on Treasure mountain, situated between Treat creek and its tributary, Lone Jack creek, which empties into the Prince of Wales reach of Jervis inlet, about 5 miles south of Vancouver bay.



In June, 1925, this property was thoroughly examined by Chas. D. Davis and associates under instructions from C. B. Fitzgerald, the manager for the Estate of the late Henry Whitney Treat, which is heavily interested in the property. As a result of this examination a comprehensive report has been made and it is expected that some development will be undertaken.

The *Copper* group was described in the Annual Reports for 1917 and 1922, and as these reports are confirmed by that of Davis it is unnecessary to give a further description here.

VICTORIA MINING DIVISION.

Lode-mining in the Victoria Mining Division has not progressed during 1925 so far as production is concerned, but more or less extensive prospecting and partial development-work was done on about fifty claims which were in good standing at the end of the year.

JORDAN RIVER SECTION.

Sunloch Group. Much of this work consists of the assessment-work on claims. On the *Sunloch* group on Jordan river, about 40 miles from Victoria, considerable prospecting was done on the *Rossland*, on the north-easterly part of the property. This prospecting was preparatory to development-work proposed for 1926 by the Sunloch Mines, Limited. A large majority of this company's stock is owned by the Consolidated Mining and Smelting Company of Canada at Trail.

The *Sunloch* group was described in the Reports for 1917, 1918, 1919, and 1920. Since the latter year and up to the present operations have been quite limited; it is therefore only necessary to refer here to previous reports and to the possibility of active operations in the near future. A site will be required for a concentrating plant, the erection of which is proposed by the Consolidated Mining and Smelting Company.

Gabbro Group. This group adjoins the *Sunloch* on the west and extends down the Jordan river on both sides. The group contains about twenty-three claims. Descriptions of the *Gabbro* group were published in the Reports for 1920, 1921, 1922, and 1923. Since the latter report certificates of work and Crown grants have been obtained for the more promising claims.

MOUNT SICKER SECTION.

Lenora. The work that was being carried on under R. G. Mellin on a lease and bond on the old *Lenora* on Mount Sicker was closed down temporarily during 1925. Mr. Mellin, however, states that he expects to resume operations during 1926. A description of the work done in 1924 was published in the Report for that year.

Richard the Third. The work being done on the old *Richard the Third* mine, adjoining the *Tyee* on the east, was examined in May, 1925. William Vanston, who was foreman on the *Richard the Third* when it was being worked twenty-five years ago, has sunk a shaft 70 feet deep, and at the time of the examination was prospecting the ground at that level by crosscuts to the north and south on the assumption that there was a probability of exposing an ore-body that had not been previously prospected.

KOKSILAH RIVER SECTION.

Eva. James Boal, of Koksilah village, owns a Crown grant from the Esquimalt & Nanaimo Railway Company for 160 acres, about three-quarters of a mile from the Canadian National Railway siding at Napier Mill, on the west side of Koksilah river. On the Crown-granted land Mr. Boal discovered pyrite and pyrrhotite ore and some years ago leased the prospect to Joe Gallo, a resident of Cowichan Station, who partially developed the mine and shipped about 500 tons of ore which he hauled 5 miles by wagon to Cowichan Station, on the Esquimalt & Nanaimo Railway. When the price of copper became too low to operate at a profit Gallo closed down the work. Since the opening of the Canadian National Railway, which passes close by the mine, transportation facilities have been very greatly improved.

An examination was made in March, 1925, in order to determine whether or not it would be advisable to reopen the mine. The development-work consists of a shaft 35 feet deep, closely timbered, and from the bottom of the shaft a drift 48 feet long driven on an incline of about 60°. The bottom of this incline was full of water and could not be examined. In the workings examined no ore of commercial value could be found, which suggests the idea that Gallo found a lens of ore of commercial grade, mined it all out, and did not attempt to discover any more.

LEECH RIVER SECTION.

A few prospectors have been working on the North fork of Leech river searching for placer gold or gold-bearing quartz veins in the slates known as the "Leech River formation," but with what success has not been reported.

Mount Skirt Group.

In the Report of the Minister of Mines for 1924 there is mentioned that a syndicate headed by S. P. Moody, of Victoria, had secured a lease and bond on the property originally known as the *Phair*, on Mount Skirt, about 1½ miles north-east of Goldstream, on the Esquimalt & Nanaimo Railway. During 1925 the old workings were pumped out and drifts sampled wherever there was any likelihood of ore.

NON-METALLIC MINERALS.

The Victoria Mining Division is fortunate in the resources it possesses in non-metallic minerals, the production of which during 1925 has helped to offset the non-production from lode or metal mines.

The non-metallic minerals that occur in the vicinity of Victoria are limestone, used for the manufacture of cement; talc, used as a base in the manufacture of paint, also in the manufacture of patent roofing and in the manufacture of some grades of paper; and a clay, the analysis of which resembles that of the mineral "bauxite" closer than has been discovered elsewhere in the Province.

The deposits of talc and the low-grade bauxite have been fully described in the Reports for 1920, 1921, 1922, and 1923.

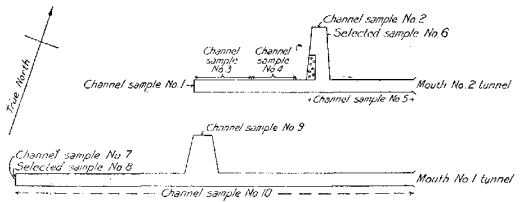
B.C. Cement Co.—This company has been one of the most successful in the West and manufactures most of the cement used in Vancouver, Victoria, and New Westminster.

Lime-rock quarries that produce the stone for the manufacture of the cement are located on Saanich arm at Tod inlet, on the east side of the arm, and Bamberton on the west side.

Some idea of the importance of the industry may be gathered from the fact that the total wages paid annually for several years past have exceeded $250,000, while the value of the cement manufactured has exceeded $1,000,000. The question of obtaining gypsum will be more readily solved since the opening of the Canadian National Railway through Grande Prairie, where a very valuable deposit of gypsum occurs. The Manitoba Gypsum Company have not previously exploited the deposit owned by them owing to distance from the railway at Kamloops.



Section along tunnel No 1
Scale of Feet
0 5 10 15 20

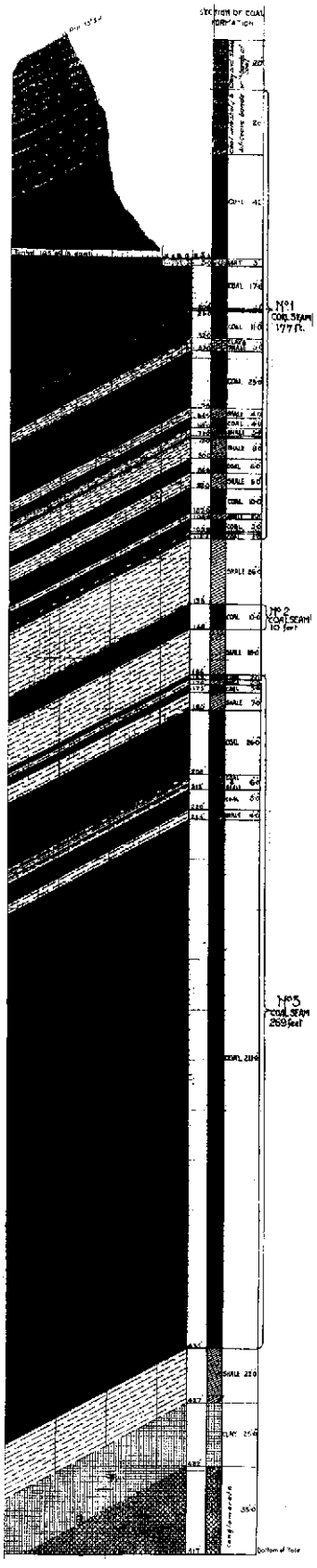


Plan of No 1 and No 2 tunnels showing location of channel samples
Scale of Feet
10 0 10 20 30 40 50

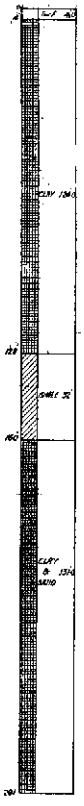


Section along tunnel No 2
Scale of feet
5 0 5 10 15 20

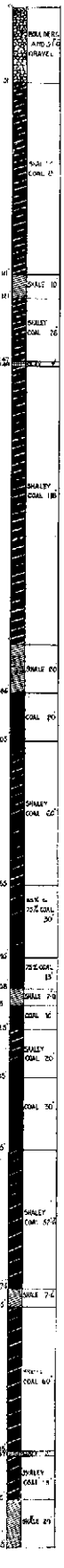
Geological Survey, Canada



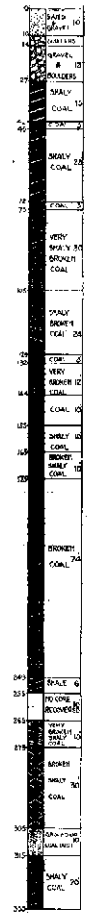
HOLE No 2
1200 FEET FROM No 1



HOLE No 3
6600 FEET SOUTH FROM No 2



HOLE No 4
4411 FEET SOUTH FROM No 2



HOLE No 5
1400 FEET SOUTH FROM No 4



HOLE No 6
1800 WEST OF No 5, AND 160' HIGHER ELEVATION

HAT CREEK COAL FIELD.
SECTIONS OF COAL FORMATION
HOLES 2. 3. 4 & 5. 6.
SCALE: 20' TO 1"

HAT CREEK COALFIELD.

SUMMARY OF REPORT BY GEORGE WILKINSON, CHIEF INSPECTOR OF MINES, AND J. D. GALLOWAY, PROVINCIAL MINERALOGIST.

LOCATION.

This property is situated in the Dominion Railway Belt, in the Land Recording District of Kamloops, British Columbia, and is about 15 miles from Pavilion, a station on the Pacific Great Eastern Railway. Pavilion is about 142 miles from Squamish, the terminal of the Pacific Great Eastern on Howe sound, and 182 miles distant from the city of Vancouver.

The Hat Creek coalfield at the point of present development is approximately 200 miles distant from the city of Vancouver and 157 miles from tide-water.

ACCESSIBILITY.

This property may be reached by way of Canadian Pacific Railway to Ashcroft; thence by motor from Ashcroft a distance of approximately 32 miles, some 14 miles of the distance being along the old Cariboo road; thence by the Lillooet road to the entrance to Marble canyon; thence along the road through the valley of Hat creek. The property can also be reached by motor from Clinton or Pavilion Stations on the Pacific Great Eastern Railway.

To make railway connections with this property will require the construction of approximately 15 miles of a spur.

The elevation of the property is approximately from 2,750 to 3,000 feet above sea-level.

GEOLOGY.

The coal-measures of the Hat Creek coalfield belong to the Tertiary period. The following is quoted from an extract from the report of Dr. G. M. Dawson, printed in Memoir 69 (No. 57, Geological Series), "Coalfields of British Columbia," page 289:—

"The upper valley of Hat creek, which runs from south to north along the east base of Clear mountains, is largely floored by sedimentary Tertiary beds, generally soft shales and sandstones. The whole surface of this wide valley is, however, so thickly covered with drift-deposits that it is impossible to define the area of the Tertiary beds with any precision. The occurrence of an important deposit of lignite coal on Hat creek near the east entrance of Marble canyon has long been known. This locality was visited by me (Dr. Dawson) in 1877."

Owing to heavy drift-deposits over the surface of the whole valley it is impossible to exactly tell the extent of the coal-measures. This can only be ascertained by extensive and systematic drilling operations. Outcrops of shale and coal are visible for a distance of some 2,000 feet along the banks of Hat creek.

A very disturbing feature in this field is the occurrence of volcanics a short distance west of and almost paralleling Hat creek. These volcanics extend along the westerly side of Mud lake and extend across the end of the lake. Beyond this point they are concealed by drift-deposits which make their total extent unknown. If the above-mentioned volcanics are the westerly limit of the coal-deposits, the field is limited in extent and may not exceed an area 1½ miles in length by a little over a third of a mile in width. The only way to ascertain what is beyond this point is by drilling.

The dip of exposure along Hat creek is south-west approximately and varies from 60° to 75°. The pitch of the seam is shown very clearly in the exposures along the bank on the west side of the creek and also in the two tunnels driven into the coal. Two reversals of dip are shown near the face of No. 2 tunnel. The reversals show the seam dipping in a north-easterly direction at an angle of approximately 35°.

A rock-exposure found in the floor of No. 2 tunnel at the point where the reversal of dip occurs may prove to have an important bearing on this deposit with reference to its thickness.

To the south and west of the outcrop of the seam as now exposed on the banks of Hat creek the measures are concealed, so the exact size of the coal-deposit cannot be ascertained precisely. Further drilling to the south and west would give information from which a definite opinion might be given as to the size of the deposit.

In the northern part of the valley and west of Hat creek there is an extensive area covered by landslip, which appears to be active at the present time. These slides give this part of the valley a look of desolation.

HISTORY OF PROPERTY.

The Hat Creek coalfield is no new discovery, but has been known for nearly fifty years. This field was visited in 1877 by the late Dr. G. M. Dawson, who reported on it for the Dominion Government. Extracts from his report can be found in Memoir 69 (No. 57, Geological Series), "Coalfields of British Columbia." Dr. Dawson again visited the field in 1894.

Referring to this deposit in his report of 1877, Dr. Dawson comments as follows:—

"A locality of some interest in connection with the Tertiary is found on Hat creek, about a mile above its abrupt bend at the entrance to Marble canyon. The exposures here extend for about 600 yards along the stream, but are not continuous, and the arrangement of the beds is somewhat complicated by the fact that considerable landslips have occurred in some parts of the banks. These have formed hollows beyond the margin of the bank, in two of which pools now lie. A great thickness of lignite coal, however, occurs here, associated with sandy or clayey, yellowish, greyish, or purplish beds, which are generally incoherent. The stream nearly follows the strike of the beds, so that the same deposit of lignite is seen in a number of places. The lowest good exposure shows over 13 feet of lignite, neither the top nor the base of the bed being seen. The lignite is pure throughout, with the exception of a few lenticular or more or less irregular masses formed by silicified or calcified stumps. In following up the stream, lignite of the same kind is frequently seen and continues to show occasional masses of fossil wood of the kinds above described, but is without shale. Some portions of the wood have been changed to ironstone of good quality, which might be of value if the lignite-bed was being worked. At the highest good exposure the beds are dipping into the western bank of the brook at an angle of 30° and are probably undisturbed. The bank was here scraped down and the section carefully examined. The result may be stated as follows, in descending order:—

	Feet.
(1.) Greyish and brownish shales and sandy clays with lignite in seams a few inches thick ..... About	20
(2.) Lignite with shaly and lenticular layers of siliceous matter, ironstone and shale. Lignite of fair quality forms about two-thirds of the whole and contains much crumbling amber	26
(3.) Lignite with little or no shale or other impurity. Below very compact, rather softer in the upper layers	42
Total	88

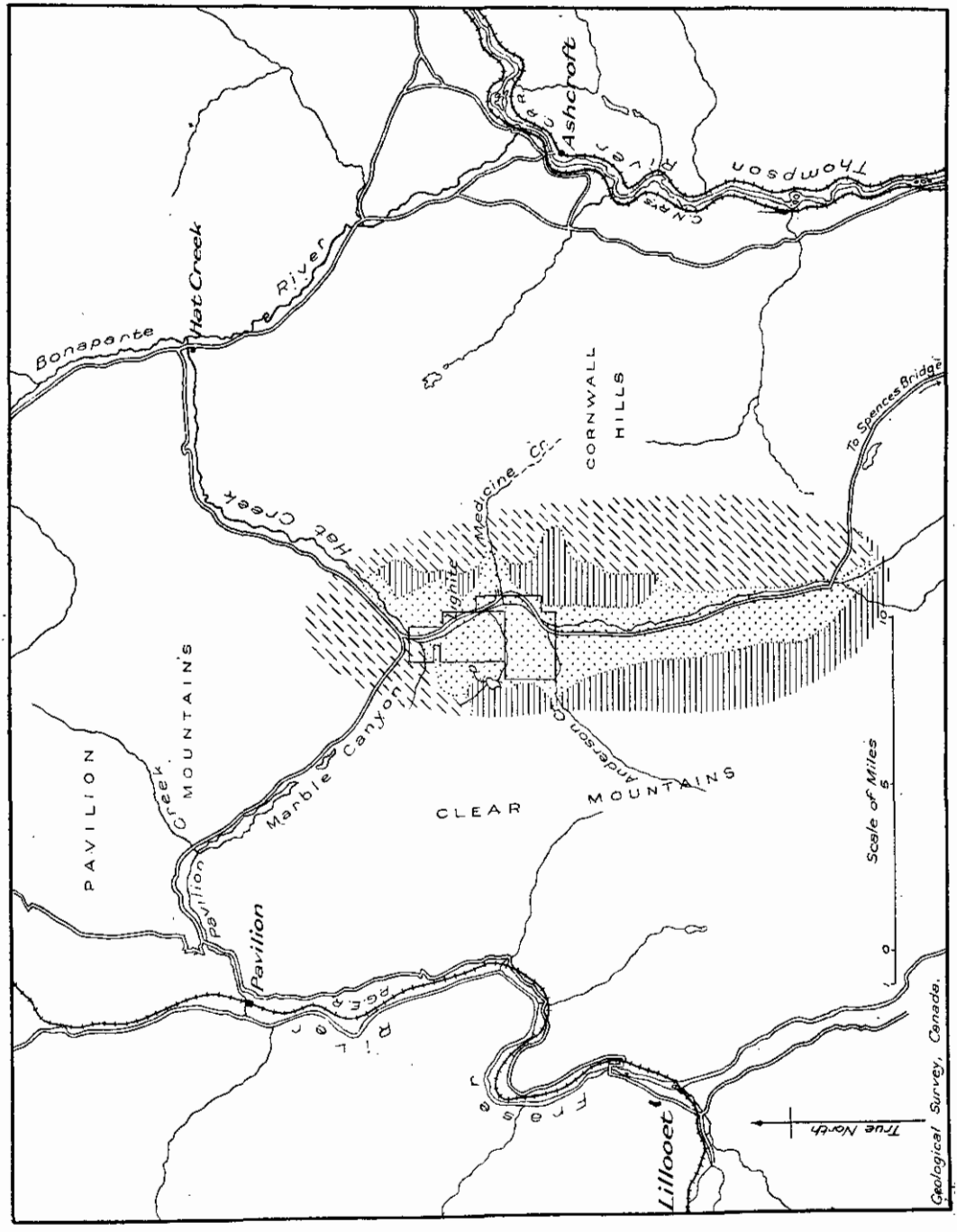
"The bottom of this enormous lignite-bed was not seen, the measurement going only to the water of the brook, beneath which it is concealed."

The writers were unable to find the 42 feet of good lignite referred to above in the banks above the stream, but found it mixed with many bands of shale.

From Dr. Dawson's report of 1894 Dr. Dowling quotes as follows:—

"In 1889 some attempt was made, by drifting and uncovering outcrops, to determine the extent and value of this lignite-deposit, but the amount of work done was inconsiderable and the additional information gained by it not great. The openings were visited by me in the same year when attention was also directed to ascertaining the limits and character of the field as a whole. The paucity of information to be derived from the exploratory work results chiefly from the fact that the beds are much disturbed where they outcrop along the banks of this part of the stream, and that an even greater amount of disturbance and irregularity has been brought to light by the work done than could have been previously anticipated. This disturbance may possibly be entirely due to the effect of old (perhaps pre-glacial) slides, affecting a former escarpment of the soft rocks along the base of which the stream was working. Part of the irregularity is certainly attributable to this cause, but I am inclined to believe that there is as well some faulting parallel to the line of the stream, or that the softer beds have here been crushed by pressure at their line of contact with the more resistant old rocks, as so often occurs.

"At this point, where the principal openings were made, the lignite and associated shales were found to dip S. 55° W., at an angle of 60° or even higher."


Ashcroft
Thompson River
Canoe
Hat Creek
Bonaparte River
Hat Creek
CORNWALL HILLS
To Spences Bridge
Lignite
Medicine Cr.
Anderson Cr.
Marble Canyon
PAVILION MOUNTAINS
Pavilion Creek
CLEAR MOUNTAINS
Pavilion
Pavilion River
Fraser
Lillooet
Scale of Miles
5
0
True North
Geological Survey, Canada.

The first attempt made to work and market Hat Creek coal was made in 1893 by George Finney, a rancher, who had operated in a small and crude way and sold it to ranchers in that vicinity, and also transported some by wagon to Ashcroft, where there was a limited market.

About two years ago a Chinese syndicate acquired the property and did some prospecting, which consisted of sinking three small shafts to the coal, and drove a tunnel in from the outcrop of the west side of Hat creek. The Clear Mountain Coal Company was subsequently organized. The official returns of this company show it mined 1,100 tons of coal during 1924. About 125 tons of the above amount was shipped to the Coast. It was hauled by motor-truck from the mine to Pavilion, a distance of 15 miles, and shipped over the Pacific Great Eastern Railway. The operations, however, were small and intermittent and owing to financial trouble the company ceased to operate in June, 1924.

During 1925 the property came under the control of the Hat Creek Coal Company, which has further prospected the field by means of diamond-drilling, and also by driving a tunnel into the deposit at a point 600 feet north-west of the tunnel driven by the Clear Mountain Coal Company.

TITLES.

This area is located in the Dominion Railway Belt and is held by leases granted by the Dominion Government.

AREA OF THE PROPERTY HELD UNDER LEASE BY HAT CREEK COAL CO.

The area held under lease by the Hat Creek Coal Company, as shown by sketch furnished by the company, is approximately 10,000 acres.

DEVELOPMENT DONE ON PROPERTY.

The development-work done consists of two tunnels driven into the deposit from the outcrop on the west side of Hat creek and a room turned off near the face of each tunnel. One tunnel is driven for a distance of 115 feet and the other for a distance of 165 feet. Several small prospect-shafts have been sunk, also seven diamond-drill holes. There is also a small open-cut or trench made on the outcrop near the northerly limits of the coal-basin. A careful section taken along the rib of No. 1 tunnel shows the tunnel had passed through alternate layers of coal and shale. There are over seventy benches of coal passed through varying from 2 inches to 9 feet 6 inches in thickness and a similar number of bands of shale and dirt varying in thickness from 1 inch to 3 feet. Approximately 129 feet or 71 per cent. of the distance is in coal and 36 feet or 29 per cent. in shale and dirt. The coal passed through is disturbed in places. A similar condition is found in No. 2 tunnel, which is located about 500 feet north-west of No. 1. A careful section taken along the right rib shows some thirty benches of coal have been passed through varying from 9 inches to 11 feet in thickness. A similar number of benches of shale and dirt is passed through varying from 2 to 3 feet, and one bench of shale and coal mixed 15 feet. Folding and disturbed conditions are found in the inner portion of No. 2 tunnel. No information is available as to what was encountered in the prospect-shafts. In the open-cut no coal of commercial value is uncovered.

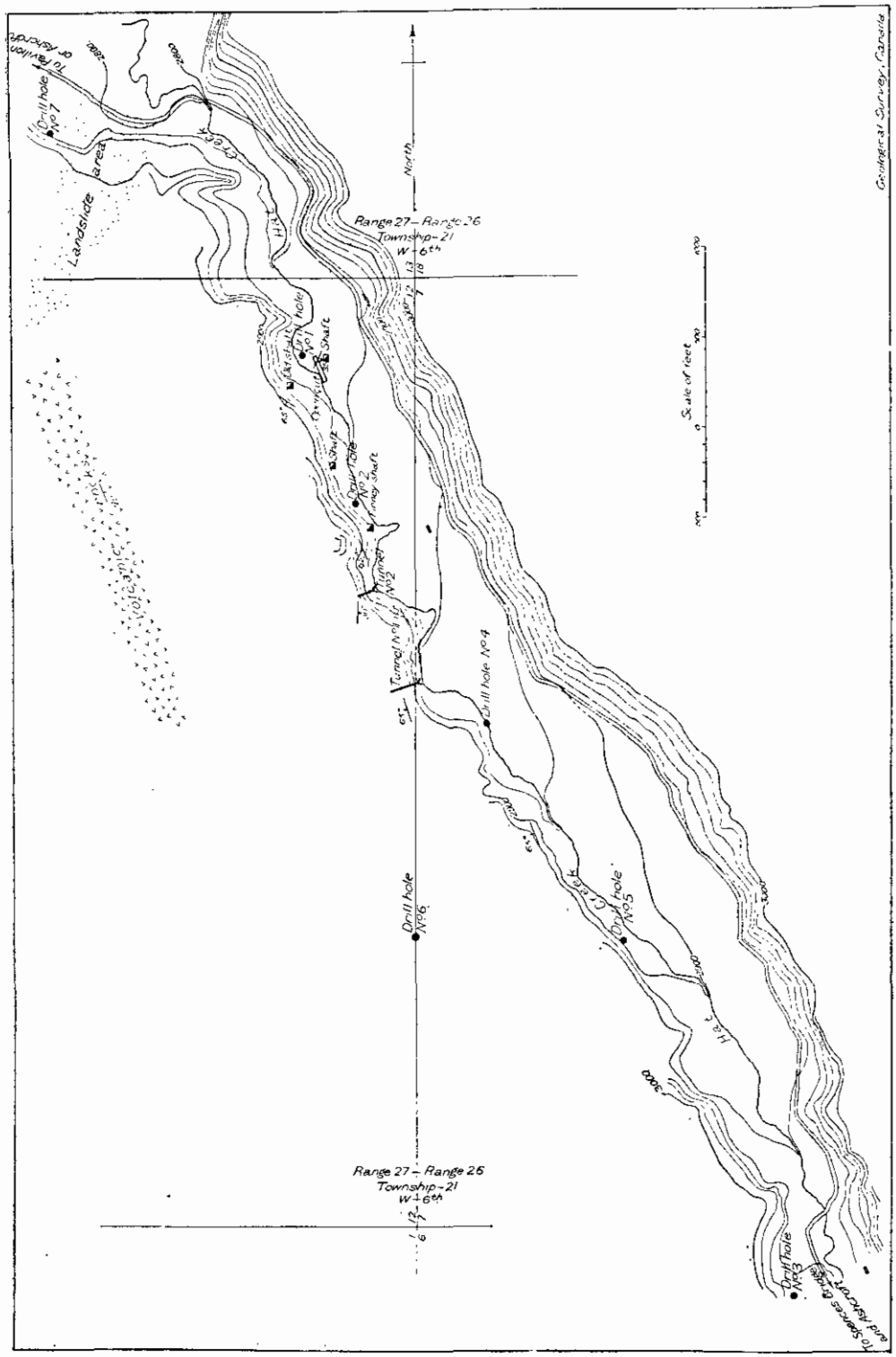
The conditions encountered in the drill-holes from records furnished by the Hat Creek Coal Company are as follows:—

No. 1 Drill-hole.—No coal encountered. Depth, 93 feet, all in boulder-clay.

No. 2 Drill-hole, drilled to a depth of 517 feet, is located about 900 feet south of No. 1 and passes through alternating beds of coal and shale. No coal was encountered beyond a depth of 435 feet. The various benches of coal passed through total 339.5 feet. The records show the smallest bench passed through to be 1 foot thick and the largest 211 feet; several benches 2 and 3 feet in thickness are shown. No information as to the grade of coal passed through is given in the records.

No. 3 Drill-hole is located about 5,600 feet south of No. 1 hole. No coal was encountered, the hole being put down to a depth of 291 feet. The records show that 124 feet of clay, 32 feet of shale, and 131 feet of clay and sand was passed through. This hole is no doubt located beyond the eastern fringe of the coal-deposit.

No. 4 Drill-hole is located about 1,400 feet south of No. 2 hole and was put down to a total depth of 625 feet, passing through alternate beds of shale, shaly coal, and coal; the records


Geological Survey, Canada
To Pavilion or Ashcroft
Drill hole No 7
Landslide area
Hat Creek
North
Range 27 – Range 26
Township – 21
W – 6th
Drill hole No 1
Shaft
Drill hole No 2
Tunnel No 2
Tunnel No 1
Drill hole No 4
Drill hole No 5
Drill hole No 6
Drill hole No 3
Scale of feet
Range 27 – Range 26
Township – 21
W – 6th
To Spences Bridge and Ashcroft

show 475.5 feet of shaly coal and 60 feet of coal. The core from this hole showed very faulty conditions and heavy dips.

No. 5 Drill-hole is located about 1,400 feet south of No. 4 hole and was put down to a depth of 335 feet, passing through shale, shaly coal, and coal. The records show 253 feet of shaly coal and 19 feet of coal. The hole was still in shaly coal when abandoned through caving.

No. 6 Drill-hole is located about 1,200 feet west of No. 5 hole on the bench land about 150 feet higher. The hole is down to a depth of 504 feet, passing through alternate bands of shale, clay, shaly coal, and coal. The records show shaly coal 59 feet and coal 156 feet, the hole being still in coal when abandoned. Much more clay and shale was encountered in this hole than in the others, some 237 feet having been passed through.

No. 7 Drill-hole is located about 1,850 feet north-west of No. 1 hole and was put down approximately 100 feet, all in boulder-clay. No. 7 hole is apparently beyond the northern fringe of the coal-deposit.

An analysis of the location of the various drill-holes shows that the continuation of the coal-deposit has been proved over a limited area.

Holes Nos. 1, 3, and 7 are located outside of the fringe of the coal-deposit.

Holes Nos. 2, 4, and 5 are all located along the strike of the outcrop and prove the continuation of the same for approximately 3,600 feet, and have of course proved the seam to a considerable depth.

No. 6 hole has proved the continuation of the deposit to a point approximately 1,200 feet west of the outcrop. The area to the south and west is all drift-covered, which conceals the measures effectively, and the only method to prove this area, as previously stated, is by drilling. At least five more drill-holes should have been put down to enable any one to intelligently and with any accuracy determine the size of the coal-deposit. One hole should have been put down about half a mile north of No. 6 and another one about half a mile south of it, and three more paralleling these about half a mile to the west.

The area actually proved by tunnels and diamond-drilling developments, giving a liberal estimate, does not exceed 110 acres.

Estimated Tonnage in Area proved by Tunnels and Drill-holes.

The average thickness of coal, including what has been termed shaly coal, as shown by drill-hole records and outcrop above level of creek, when reduced to thickness at right angles to the dip, is approximately 234 feet. The area proven to be underlaid by coal-deposit by tunnels and drill-holes is approximately 110 acres.

Assuming 100 tons per inch in thickness per acre, which is the amount usually taken by engineers for practical purposes, and which allows about 20 per cent. for waste, faults, and other ordinary losses, the total deposit of coal within the above-named area actually proven, including what is termed shaly coal in drill-hole records, is as follows: $110 \times 234 \times 1,200 = 30,880,000$ tons.

The average thickness of coal within the above-named area, exclusive of that termed shaly coal, as shown by drill-hole records and outcrop above level of creek, when reduced to thickness at right angles to dip, is approximately 105 feet.

The total amount, exclusive of that termed shaly coal, actually proven within the above-mentioned area is therefore: $110 \times 105 \times 1,200 = 13,860,000$ tons.

Probable Tonnage in Area East of Line projected in a Southerly Direction from End of Volcanic Exposure.

Sufficient drilling has not been done to enable any one to form a definite idea as to the size of the coal-deposit, and until drilling has been done west of a line projected from the end of the volcanic exposure in a southerly direction it cannot be assumed that the coal-deposit extends beyond that point

On the easterly side of a line projected in a southerly direction from the end of the volcanic exposure there is probably some 300 acres within the coal-bearing formation.

Assuming the thickness of deposit used in former calculations continues, the above-mentioned 300 acres may contain, including what has been termed shaly coal, a deposit of 87,240,000 tons.

The above figures are of course based on the assumption that the coal-deposits extend over the area mentioned above, which fact has not yet been proved.

Analyses of Fifty-five Samples of Hat Creek Coal (Air-dried).

No.	Moisture.	V.C.M.	F.C.	Ash.	Fuel Ratio.	Split Volatile Ratio.	Calorific Value, B.T.U.'s.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.			
1	20.50	32.50	44.70	2.30	1.38	1.65	9,765
2	18.60	26.40	35.70	19.30	1.35	1.53	7,740
3	20.00	27.50	41.30	11.20	1.50	1.63	.....
4	18.50	32.80	40.30	8.40	1.23	1.62	.....
5	19.70	31.30	41.90	7.10	1.33	1.62	.....
6	19.50	30.50	42.40	7.60	1.39	1.66	.....
7	20.20	32.20	39.30	8.30	1.22	1.52	.....
8	18.00	33.50	41.50	7.00	1.24	1.66	.....
9	29.90	30.10	39.10	9.90	1.29	1.50	.....
10	20.10	31.90	39.90	8.10	1.25	1.54	.....
11	18.40	31.10	37.40	14.10	1.24	1.56	.....
12	29.90	31.10	39.30	8.70	1.26	1.39	.....
13	19.20	28.30	37.80	14.70	1.30	1.55	8,370
14	20.00	29.70	41.70	8.60	1.40	1.62	.....
15	19.00	30.50	41.40	9.10	1.35	1.65	.....
16	15.00	30.80	41.10	13.10	1.33	1.85	.....
17	20.00	31.90	42.10	6.00	1.32	1.62	9,222
18	20.90	29.00	41.40	8.70	1.42	1.57	.....
19	17.40	32.70	38.80	11.10	1.18	1.63	.....
20	15.30	33.80	38.80	12.10	1.14	1.73	.....
21	19.20	32.10	46.70	2.00	1.45	1.77	9,780
22	17.10	31.00	42.80	9.12	1.38	1.78	.....
23	16.80	27.20	31.90	24.10	1.13	1.82	7,100
24	19.30	32.30	37.00	11.40	1.14	1.50	8,420
25	14.40	31.00	34.50	20.10	1.10	1.67	7,900
26	21.00	32.00	38.40	8.60	1.20	1.47	8,550
27	19.85	27.35	44.05	8.75	1.60	1.72	8,676
28	19.35	33.60	39.35	7.70	1.19	1.52	9,200
29	19.20	35.14	36.64	9.02	1.04	1.44	.....
30	21.40	34.80	34.80	9.00	1.00	1.34	8,500
31	20.64	31.05	39.29	9.02	1.26	1.50	8,626
32	20.00	34.30	36.60	9.10	1.03	1.50	8,627
33	21.40	28.20	32.30	18.10	1.14	1.30	7,500
34	19.10	28.40	31.60	20.09	1.11	1.37	7,400
35	25.70	28.10	39.00	7.20	1.42	1.61	8,250
36	17.10	30.06	31.30	21.00	1.02	1.44	7,700
37	17.70	30.05	31.80	20.00	1.04	1.33	7,720
38	15.50	22.50	23.70	38.30	1.05	1.26	5,600
39	8.70	34.20	37.60	19.50	1.10	2.12	8,670
40	9.40	34.80	34.00	21.80	0.97	2.12	8,080
41	10.80	35.30	43.70	10.20	1.20	2.15	9,400
42	9.40	36.80	25.50	28.30	0.69	1.58	7,530
43	9.80	34.70	33.10	22.40	0.95	1.85	8,230
44	10.00	27.20	23.90	38.90	0.87	1.59	5,930
45	15.80	30.70	33.50	20.00	1.10	1.56	7,920
46	15.40	31.00	31.60	22.00	1.10	1.52	7,550
47	18.50	32.50	41.30	7.70	1.25	1.65	9,000
48	14.40	31.20	28.50	25.90	0.92	1.04	7,210
49	15.30	32.30	31.70	20.70	0.98	1.25	7,952
50	12.30	26.10	22.70	38.90	0.87	1.41	5,710
51	14.00	38.10	35.90	12.00	0.94	1.66	.....
52	13.50	42.70	33.60	10.20	0.78	1.57	.....
53	18.00	32.80	36.20	13.00	1.07	1.52	.....
54	22.60	30.60	33.50	13.30	1.09	1.02	.....
55	14.10	28.00	27.40	30.50	0.98	1.42	.....

Average of Fifty-five Analyses of Hat Creek Coal (Air-dried).

	Per Cent.
Moisture	17.40
Volatile combustible matter	31.40
Fixed carbon	36.60
Ash	14.60
Total	100.00
F.C./V.C.M.	1.17
Dowling's Split Volatile Ratio	1.55
British thermal units (average 32 analyses)	8,056

Analyses Nos. 1 to 26, 35 to 38, and 51 to 55, inclusive, made by Provincial Bureau of Mines, Victoria, B.C.

Analyses Nos. 30 and 45 to 50, inclusive, made at Fuel Testing Laboratories, Mines Branch, Ottawa.

Analyses Nos. 39 to 44, inclusive, made by U.S. Bureau of Mines Experiment Station, Pittsburgh.

Analysis 27 made by P. W. Thomas, Assayer, Vancouver; No. 28, by J. R. Williams, Assayer, Vancouver; No. 29, by G. S. Eldridge, Assayer, Vancouver; No. 31, by Professors Corey and Daniels, College of Mines, University of Washington, Seattle, Wash.; and No. 32, by Clyde Williams, Superintendent, Northwest Experiment Station, U.S. Bureau of Mines, Seattle, Wash.

Averages of Twelve Analyses of Hat Creek Coal as received.

No.	Moisture.	V.C.M.	F.C.	Ash.	Fuel Ratio.	Split Volatile Ratio.	Calorific Value, B.T.U.'s.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.			
1	28.3	26.8	29.6	15.3	1.10	1.03	6,800
2	25.5	28.6	28.0	17.9	0.98	1.06	6,640
3	33.3	26.3	32.8	7.6	1.24	0.98	7,030
4	26.0	30.1	20.8	23.1	0.69	0.87	6,150
5	25.1	28.9	27.3	18.7	0.94	1.05	6,842
6	28.0	21.7	19.2	31.1	0.88	0.63	4,740
7	28.9	25.9	28.3	16.9	1.09	0.98	6,680
8	26.2	27.0	27.6	19.2	1.02	1.03	6,590
9	35.4	25.8	32.7	6.1	1.26	0.94	7,140
10	27.3	26.5	24.2	22.0	0.91	0.92	6,120
11	23.7	28.3	27.8	18.2	0.98	1.02	6,970
12	29.1	21.1	18.3	31.5	0.86	0.73	4,610
	28.3	26.4	26.4	18.9	0.996	0.936	6,359

Average of Twelve Analyses of Hat Creek Coal as received at the Laboratory.

	Per Cent.
Moisture	28.3
Volatile combustible matter	26.4
Fixed carbon	26.4
Ash	18.9
Total	100.0
F.C./V.C.M. ratio	1.0
Dowling's Split Volatile Ratio	0.93
British thermal units	6,359

In the twelve analyses quoted as received, analyses 1 to 6, inclusive, were made at the Bureau of Mines, Pittsburgh, and 7 to 12, inclusive, were made at the Fuel Testing Laboratories, Department of Mines, Ottawa.

CLASSIFICATION OF HAT CREEK COAL.

Several classifications of coal have been suggested by various authorities in different countries.

The classifications used in this report are Dowling's Split Volatile Ratio and the classification used by the Department of Mines, Ottawa, in their "Investigation of Fuels and Fuel Testing, 1923."

Dowling's classification, which he calls the "Split Volatile Ratio," has been adopted generally in Canada and has been used for the classification of coals in the "Canadian Geological Survey Bulletin," "The Coalfields of Manitoba, Saskatchewan, Alberta, and Eastern British Columbia," volumes published by the Geological Survey Branch, Ottawa. It has also been adopted and used by the Provincial Bureau of Mines since 1909.

$$\text{Split Volatile Ratio} = \frac{\text{Fixed Carbon} + \frac{1}{2}\text{ Vol. Combustible.}}{\text{Moisture} + \frac{1}{2}\text{ Vol. Combustible.}}$$

The resultant numerical value for the ratio as above indicated, if applied to the following scales, gives the class to which the coal belongs:—

Dowling's Split Volatile Ratio.

Anthracite	15 up.	Bituminous	3.5 to 6
Semi-anthracite	13 to 15	Low-carbon bituminous	3 to 3.5
Anthracite coal	10 to 13	Lignitic coal	2.5 to 3
High-carbon bituminous	6 to 10	Lignite coal	1 to 2.5

The average of fifty-five analyses, on an air-dried basis, of Hat Creek coal given in the report show a Split Volatile Ratio of 1.55; therefore, according to Dowling's Split Volatile Ratio, it is classed as a lignite. Twelve analyses of coal as received at the Laboratories give a Split Volatile Ratio of 0.936.

For the purpose of comparison, analyses of a sample of coal taken by the Honourable the Premier, 40 feet in the tunnel, made by the Provincial Bureau of Mines and by the Mines Branch at the Fuel Testing Laboratories at Ottawa, is given below, with an analysis of a typical lignite of the Province of Alberta:—

	Hat Creek Analysis by Provincial Bureau of Mines.	Hat Creek Analysis by Mines Department, Ottawa.	Cardiff Colliery, Alberta.
	Per Cent.	Per Cent.	Per Cent.
Moisture	21.00	21.40	20.00
Volatile combustible matter	32.00	34.80	31.60
Fixed carbon	38.40	34.80	40.40
Ash	8.60	9.00	8.00
F.C./V.C.M. ratio	1.20	1.00	1.27
Split Volatile Ratio	1.45	1.34	1.57
British thermal units	8,550	8,550	8,768

In some of the press reports Hat Creek coal has been referred to as a "sub-bituminous" coal. In the classification of coals in Canada the term "sub-bituminous" is not generally used, but is occasionally used in referring to better-class lignites or lignitic coals. The term "sub-bituminous" is of American origin. It may not be out of place to here quote the origin of the name and the purpose of its use. On page 372, "Coal Miners' Pocket Book" (eleventh edition), the chapter on fuels gives a definition on the various classes of coals. Under the head of "Sub-bituminous Coals" the following explanation is found:—

"The very convenient term sub-bituminous coals, which originated with Dr. M. R. Campbell, of the United States Geological Survey, is given to that large and valuable group of coals that possess some of the undesirable features of the true lignites or brown coals, together with many of the desirable features of the true bituminous coals. They are sometimes called 'black lignites' from their colour, which is often highly lustrous and not to be distinguished from that of the bituminous coals proper."

The following quotation is found on page 373, in defining "lignites":—

"Primarily the distinction between sub-bituminous coal and lignite is one of colour alone; the former is black and the latter brown."

In other words, the black lignites are now called sub-bituminous coal in the United States and the lignitic coals are sometimes referred to as sub-bituminous coals in Canada.

The following quotation is found on page 1, "Investigation of Fuels and Fuel Testing, 1923," in reference to Alberta coals:—

"The lignite coals from the Province are known as black lignites in contrast with the brown Saskatchewan lignite, and the terms 'black lignite' and 'sub-bituminous' are often used as interchangeable."

On page 2 of the same report the following quotation is found in reference to classification of sub-bituminous coals:—

"Without going into the details of chemical classification, the sub-bituminous coal for the purpose of this report may be defined as those non-coking (bituminous) coals having less than *10 per cent. moisture when freshly mined and having a hygroscopic moisture in the neighbourhood of 6 to 7 per cent. when air-dried to constant weight in an atmosphere of approximately 60 per cent. humidity.*"

From the above quotation it is apparent the Hat Creek coal, which contains approximately 28 per cent. moisture when freshly mined and 17.4 per cent. moisture when air-dried, would not be classified as sub-bituminous at the Testing and Research Laboratories, Ottawa. However, the quibbling with names does not change the calorific value of any coal; therefore the following tables are compiled with the object of comparing by analyses Hat Creek coal with other coals in different parts of the Province of British Columbia.

Comparison of analysis of Hat Creek coal with other British Columbia coals:—

Vancouver Island Coals.

	Douglas Seam.	Newcastle Seam.	Wellington Seam.	Comox Seam.	Suquash.	Hat Creek.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Moisture	1.60	1.90	1.10	1.10	5.03	17.40
Volatile combustible matter	40.60	40.70	39.70	32.20	34.85	31.40
Fixed carbon	47.70	45.70	49.20	56.30	45.78	36.60
Ash	10.10	11.70	10.00	10.40	14.34	14.60
F.C./V.C.M. ratio	1.20	1.10	1.25	1.75	1.31	1.17
Split Volatile Ratio	3.10	2.97	3.29	4.21	2.81	1.55
British thermal units	12,620	12,230	13,020	13,210	11,000	8,056

Douglas, Newcastle, Wellington, and Comox analyses taken from Analysis of Canadian Fuels, Part V., compiled by Edgar Stanfield, M.Sc., and J. H. Nicolls, M.Sc.

Suquash analysis from analysis made by Department of Mines, Ottawa, for the company.

Hat Creek average of fifty-five air-dried analyses given in this report.

Nicola-Princeton District Coals.

	Middlesboro Collieries.	Coalmont Collieries.	Princeton Collieries.	Hat Creek.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Moisture	3.90	2.97	11.97	17.40
Volatile combustible matter	37.60	31.28	30.49	31.40
Fixed carbon	44.50	52.49	49.21	36.60
Ash	14.00	13.26	8.33	14.60
F.C./V.C.M. ratio	1.20	1.64	1.61	1.17
Split Volatile Ratio	2.78	3.60	2.40	1.55
British thermal units	11,230	*	*	8,056

* Not available.

Middlesboro analysis taken from Analysis of Canadian Fuels, Part V.

Coalmont and Princeton analyses taken from Minister of Mines' Report, 1920.

Crowsnest Pass Coals.

	Fernie.	Michel.	Corbin.	Hat Creek.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Moisture	0.50	1.20	0.60	17.40
Volatile combustible matter	23.90	23.80	23.40	31.40
Fixed carbon	64.90	64.90	63.80	36.60
Ash	10.70	10.10	12.20	14.60
F.C./V.C.M. ratio	2.70	2.70	2.70	1.17
Split Volatile Ratio	6.17	5.86	6.13	1.55
British thermal units	13,430	13,330	*	8,056

* Not available.

Fernie, Michel, and Corbin analyses taken from Analysis of Canadian Fuels, Part V.

Northern British Columbia Coals.

	Telkwa.	Bulkley Valley.	Peace River.	Groundhog.	Hat Creek.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Moisture	0.60	2.70	1.60	2.62	17.40
Volatile combustible matter	33.90	22.90	15.90	6.96	31.40
Fixed carbon	56.00	68.80	77.45	84.49	36.60
Ash	9.50	5.60	5.10	5.93	14.60
F.C./V.C.M. ratio	1.65	3.05	4.86	12.13	1.17
Split Volatile Ratio	4.20	5.60	8.90	14.40	1.55
British thermal units	*	*	*	13,814	8,056

* Not available.

Telkwa, Bulkley Valley, Peace River, and Groundhog analyses taken from Minister of Mines' Report, 1920.

POSSIBILITIES OF A MINE IN THIS AREA (METHOD OF WORKING).

This coalfield has been mentioned as a possible stripping operation and mining by steam-shovel, but it is considered that this would not be practicable for the following reasons:—

The only portion that may be considered as a possible stripping operation is the portion above the creek-level on the westerly side. An analysis of the conditions found there prove the impossibility of steam-shovel operations in this part. The exact thickness of the mantle of glacial drift covering is unknown and no doubt will be variable. From what can be seen it appears to run from 10 to 30 feet, say 20 feet on an average. In addition to the above, the first 20 feet of the deposit consists of greyish and brown shales and sandy clays with lignite in seams a few inches thick. The second 26 feet consists of lignite, with shaly and lenticular layers of siliceous matter, ironstone, and shale. Lignite of fair quality forms about two-thirds of the whole and contains much crumbling amber.

The lower portion of the deposit above the creek-level has been tested by the two tunnels driven in, which show alternate layers of coal and shale, about 71 per cent. of No. 1 tunnel being in coal and about 60 per cent. of No. 2 tunnel being in coal. The total above creek can be summarized about as follows:—

	Feet.
Glacial drift, clay, sand, and boulders	20
Greyish and brownish shales and sandy clays with lignite a few inches thick	20
Lignite, with shaly and lenticular layers of siliceous matter, ironstone, and shale. Lignite of fair quality forms about two-thirds of the whole and contains much crumbling amber	26
Lignite with alternate bands of shale, lignite forming about two-thirds of the whole	42
Total	108

From the above it will be observed that 40 feet or 37 per cent. will have to be completely stripped before mining operations could be started. Then of the remaining 68 feet two-thirds of it is impurities, the most of which would be broken up among the smaller-grade coals. This would make necessary the installation of the most up-to-date cleaning plant to handle the product, with a consequent probable recovery of not over 50 per cent. from the workable portion of the deposit and about 30 per cent. recovery from the total material handled.

Of the 30 per cent. recovered, probably not more than 40 per cent. would be domestic lump coal. In other words, for every 2,000 lb. of material handled there would be a probable recovery of 240 lb. of domestic lump coal, or for every ton of domestic lump coal mined there would be 8½ tons of material handled, or 3½ tons of material moved, for every ton of coal mined on a mine-run basis, which would make the cost of mining by steam-shovel prohibitive.

Another problem that would confront operations by steam-shovel is the disposal of the waste material, which would be a difficult matter to solve.

The conditions dealt with so far under this heading are those found at the outcrop. Going back to No. 6 drill-hole, which is located about 1,000 feet west of the outcrop, conditions found preclude any possibility of steam-shovel operations, as a depth of 255 feet is reached before the broken ground is passed through.

After viewing this phase of operations from every angle, the conclusion is that a steam-shovel method of mining would not be economically possible. The only method of mining that can be adopted in the exploitation of this property is by room-and-pillar method.

COST OF MINING, TRANSPORTATION, MARKETS, AND COMPETITION.

The cost of mining in the early part of the operation of a mine at Hat creek would no doubt be less than the costs in the Vancouver Island and Nicola-Princeton areas. But no doubt this would be more than offset in the rate at the present time quoted by the Pacific Great Eastern Railway for transportation of the Hat Creek coals to the Coast markets.

The following shows the cost of transportation from the different coal-mining centres now shipping coal to Vancouver:—

Vancouver Island mines to Vancouver by water....60c. to 75c. per ton of 2,240 lb.

Freights on railway—

Ladysmith to Vancouver	$1.10	per ton of	2,240 lb.
Nanaimo to Vancouver	1.60	„	„
Coalmont to Vancouver	1.60	„	2,000 lb.
Tulameen Valley mine to Vancouver	1.60	„	„
Princeton to Vancouver	1.80	„	„
Fernie to Vancouver	4.20	„	„
Michel to Vancouver	4.20	„	„
Pavilion to Vancouver ..... 17c. per 100 lb. or	3.40	„	„
Pavilion to Vancouver	3.80	„	2,240 lb.

(Rate, as given above from Pavilion to Vancouver, quoted by manager, P.G.E. Railway.)

A careful perusal of the above freight-rate charges show a margin of $3.05 per ton (2,240 lb.) between the Vancouver Island water transportation rate and the Hat Creek rate to Vancouver, and $2.70 margin per ton (2,240 lb.) between railway rates from both places. The transportation rate from Nicola-Princeton area is from $1.60 to $1.80 less than the present rate quoted from Hat creek.

It is therefore apparent that the Hat Creek coal would have to be produced at a considerable less cost than coal mined in the two above-mentioned areas to compete with them in the Coast markets, even though it was of the same quality and yielded the same percentage of grades. The analysis given in this report indicates that it is not of the same quality and has a very much lower calorific value than Vancouver Island, Coalmont, and Middlesboro coals.

It may be mentioned here that the manager of the Pacific Great Eastern Railway states that in the event of a steady movement, involving large tonnage, they would be prepared to quote a considerably lower rate. Any reduction in freight rate would help to make Hat Creek coal a possible competitor in the Coast markets.

The local market in the vicinity of the Hat Creek coalfield at the present time is limited and would not warrant the expenditure necessary to put in a modern plant. For catering to bunker trade the Vancouver Island mines have a decided advantage through being located on tide-water.

CONCLUSIONS.

That there is a fairly large deposit can be conceded, and further drilling done in an intelligent manner may prove the field to be of larger extent than given in this report. Further drilling is the only way by which the exact size of the field can be ascertained.

The coal so far proved and tested, using Dowling's Split Volatile Ratio, and the classification given by the Department of Mines, Ottawa, in "Investigation of Fuels and Fuel Testing, 1923," is of lignite quality, as shown by numerous analyses given in this report.

A very serious question to be considered in this field from an operating standpoint will be the ultimate percentage of recoverable coal. On account of the very extreme thickness of this deposit and the many layers of shale mixed with the coal, many difficulties will be encountered in working the same and the percentage of recovery to the total will be small. While no movement is shown in the present short tunnels, if extensive workings are made there is going to be some very bad crushing movement of the deposit, due to faulting and folding, and the fact that there are no self-supporting strata overlying the deposit. This will necessitate heavy timbering to prevent squeezes, which are usually accompanied by other troubles that follow along with them.

There may not be much hope for a mine in this field at the present time, competing with other districts, while operating under ordinary mining and marketing conditions, but undoubtedly the deposit is an asset to the Province, and will ultimately be of great value. Careful investigation along various lines should be carried out to ascertain the methods to be adopted to make the exploitation of this field possible—namely, "carbonization," "briquetting," "hydrogenation of coal," etc.

The factors that are against an early development of the area to compete in present markets may be summarized as follows:—

(1.) Heavy cost to build spur railway.
(2.) Expensive plant for cleaning and preparation of product.
(3.) High freight rates to put coal into present markets.
(4.) Disadvantage of railway transportation as against water transportation from some of the other collieries that would be competitors.
(5.) Quality of coal, lower calorific value than competitors.
(6.) Coal will not stand handling and storage, but will disintegrate very rapidly if left in open air and sun, thereby causing severe loss in handling.
(7.) Mines operating at present are not working full time the whole year, making difficult market conditions for a new colliery, especially when coal is of lower calorific value than competitors.

UPPER HAT CREEK COAL-DEPOSIT, B.C.

SUMMARY STATEMENT BY B. R. MACKAY, GEOLOGICAL SURVEY, CANADA.

GENERAL STATEMENT.

During the past summer (1925) widespread interest was aroused by press reports that an immense field of hard high-grade sub-bituminous coal had been proven by diamond-drilling operations on the upper part of Hat creek, 14 miles west of Ashcroft, in Kamloops Mining Division, British Columbia. According to these reports three coal-seams, measuring 177 feet, 10 feet, and 269 feet in thickness and separated by 26 feet and 18 feet of shales respectively, had been pierced within a depth of 523 feet. The coal was stated to rank fifth in heat units among all the coals entering the Pacific market, and as the field is readily accessible to the Pacific Great Eastern Railway the exploitation of the deposit was widely considered to be a most attractive proposition.

This coal-deposit has long been known and in the seventies was examined by Dr. G. M. Dawson, who reported on it in the Geological Survey Report of Progress for 1877–78 and in the Annual Report for 1894. Dr. Dawson described the deposit as an enormous bed of good-quality lignite occurring in rocks of Tertiary age. He observed 42 feet of clean coal exposed in an 88-foot section above creek-level. He expressed the opinion that the great thickness of the deposit should render it of some importance at least locally, and that from analogy with the Nicola Valley coal occurrence a fuel of the character of true coal might possibly be found beneath the lignite.

Owing to the renewed interest created in the deposit by the recent development-work the writer visited the area with the object of securing additional data pertaining to the extent and character of the deposit. Four days were spent examining coal-outcrops and tunnel sections, collecting channel samples for analyses, and searching the neighbourhood for other outcrops of the coal-measures. As the drill-cores had been removed from the field he did not have this help in ascertaining the character and structure of the coal, and for data on these points is largely dependent on the drill-logs compiled by the Pacific Great Eastern Railway Company. The writer's thanks are due to T. Kilpatrick, general manager of the Pacific Great Eastern Railway Company, and to E. A. Haggen for blue-prints and other data supplied, and to A. K. Kollias, J. D. Galloway, Provincial Mineralogist for British Columbia, and George Wilkinson, Chief Inspector of Mines, for assistance rendered while in the field.

LOCATION.

The Hat Creek coal-deposit is located in the Dominion Railway Belt in the Kamloops Land Recording Division, British Columbia (latitude 50° 45′, longitude 121° 35′). It lies on the upper part of Hat creek, 15 miles from its junction with Bonaparte river. It is 30 miles distant by road from Ashcroft, on the Canadian National and the Canadian Pacific Railways, and 16 miles from Pavilion, on the Pacific Great Eastern Railway. The coalfield is connected with both these railway centres by excellent motor-roads. It is most conveniently reached, however, from Vancouver and outside points via Ashcroft, as the Pacific Great Eastern terminal is at Squamish, on Howe sound. The coal outcrops on the west bank of upper Hat creek a mile above the mouth of Marble canyon, at an approximate altitude of 2,860 feet. Exposures occur at intervals along the stream-bank for about 1,500 feet.

GENERAL GEOLOGY.

The general geology of Hat Creek area is fully described by Dr. Dawson in his report on the Kamloops map-sheet appearing in the Annual Report of the Geological Survey for 1894, and those interested are referred either to the original report or to the extracts from it referring to the coal-deposits which appear in Memoir 69, pages 289–294, Coalfields of British Columbia. As the writer's examination was confined to the immediate vicinity of the coal-deposit only a very brief description of the formations encountered will be given.

The formations occurring in the vicinity of the coal-deposit are:—

	Formations.		Rock Types.
Quaternary	Recent Pleistocene		Stream-gravels, landslides, lake deposits, glacial gravels, boulder-clay.
		Unconformity.	
Tertiary	Miocene		Volcanic breccia, basalt breccia, tuffs.
		Unconformity.	
	Eocene	Coldwater group	Basal conglomerate, semi-indurated sandstone and shales, and coal-seams.
		Unconformity.	
Mesozoic?	Jurassic?	Stocks	Granite, granodiorite, diorite.
		Igneous contact.	
Palaeozoic	Carboniferous	Marble Canyon limestone Cache Creek group	Limestones, argillites, marble.

The oldest rock formation exposed near upper Hat creek and the one which apparently underlies all of the coal-basin is a thick series of compact grey limestones and argillites of Carboniferous age. These beds, termed by Dawson the Cache Creek group, have been folded and faulted and 3 miles to the west of upper Hat creek are intruded by several large granitic stocks composed of granite, granodiorite, and diorite, so that much of the limestone has been converted into marble, hence the name Marble canyon. The age of the intrusives is not definitely known, but they are thought to be Jurassic, the period of the Coast Range batholith intrusion.

Lying unconformably upon the limestone is a series of early Tertiary lake deposits, several thousand feet thick, consisting of a basal conglomerate overlain by brown to purplish-weathering semi-indurated sandstones, shales, and clay, which in the upper part of the series carry thick seams of lignite. The sediments, which have been designated by Dawson the Coldwater group, are confined to the lower slopes of Hat creek and it may be that the coal-basin is very limited in extent. From the divergence of dip observed in the tunnel sections and the volcanic outcrop 1,000 feet distant the Tertiary sediments appear to be unconformably overlain by Miocene volcanics consisting of basalt, breccias, and tuffs, the latter being in places fine-grained and showing distinct stratification as if laid down under water. These have also been subjected to folding and faulting parallel to the general axis of the valley, so that they now dip at angles up to 45°. The volcanics have their greatest development to the west of Hat creek, covering all of Clear Mountain range, where the vents were apparently located. Late Tertiary erosion has largely removed the volcanics from the valley area, but remnants of the extensive flows still occur on the east slope of the valley and on the west of Hat creek close to the coal-outcrop.

During the Pleistocene a blanket of boulder-clay and glacial gravels over 100 feet thick covered the valley and valley-slopes to the height of about 1,000 feet. Much of this is of a typical moraine deposit characterized by knob and kettle topography and by numerous small lakes. Later stream-erosion has developed a series of terraces along the valley and has exposed along the channel of Hat creek the coal-measures, while more recent undermining by the stream has developed in the pervious glacial drift a prominent landslip just north of the coal-outcrop. The landslip area is characterized by badland topography in two of the larger depressions of which small lakes occur.

The economic interest of the area from the mining standpoint centres in the thick deposit of Tertiary lignite. As far as the writer could determine, the coal-measures outcrop only in the immediate vicinity of Hat creek. Dawson speaks of soft yellowish Tertiary shales capped by vesicular lava at the base of Clear Mountain range at an elevation of about 650 feet above the creek-level, but neither this exposure nor a reported occurrence on Finney creek could be

found. Tertiary volcanics outcrop 1,100 feet west of the coal-exposure on Hat creek at about 200 feet above creek-level and over an area about 300 feet wide by 1,000 feet in length. They strike N. 160° E. and dip 45° S.E., but owing to the drift mantle their relationship to the coal-measures could not be determined. The covering of boulder-clay and glacial gravels so completely conceals the bed-rock that the boundary of the coal-measures cannot be determined with any degree of precision.

DEVELOPMENT-WORK.

Development-work on the deposit began in a small way in 1889 and a drift 18 feet in length was driven into the outcrop. In 1893 a Mr. Finney, a local rancher, acquired title to the land and sank a shaft near the lower exposure to a depth stated to be 125 feet. The coal had a limited local sale, but with Finney's disappearance the operations ceased and no further attempt appears to have been made until 1923. Then a Chinese syndicate, having acquired the property, sank three shallow shafts, drove a tunnel 188 feet into the uppermost exposure on the west side of the creek, and made an open-cut about 200 feet in length, 1,800 feet down-stream. Two small tipples were erected with the object of shipping the coal by motor-truck to the Pacific Great Eastern Railway, but operation ceased before this was accomplished owing to the syndicate running out of funds. The Clear Mountain Coal Company, Limited, which was subsequently formed to take over and develop the property, did ship three car-loads of the coal, but the marketing of it in Vancouver proved a failure and the company went into bankruptcy. Early in 1925 the property was acquired by the Hat Creek Coal Company, Limited, which drove a second tunnel 105 feet into the same exposure about 600 feet to the north of tunnel No. 1 and opened up a room on its north side 25 feet deep. Later it began a systematic diamond-drilling programme to prove up its holdings. In all seven holes were sunk over a length of 1½ miles, at from 1,400 to 2,000 feet apart and to depths ranging from 60 to 635 feet. Five of these holes were placed along the channel of Hat creek, conforming closely to the strike of the measures, and the remaining two holes were offset about 1,000 feet west of this line. The position of these holes, together with that of the shafts, tunnels, and open-cut, are shown on the accompanying plan.

STRUCTURE AND THICKNESS OF DEPOSIT.

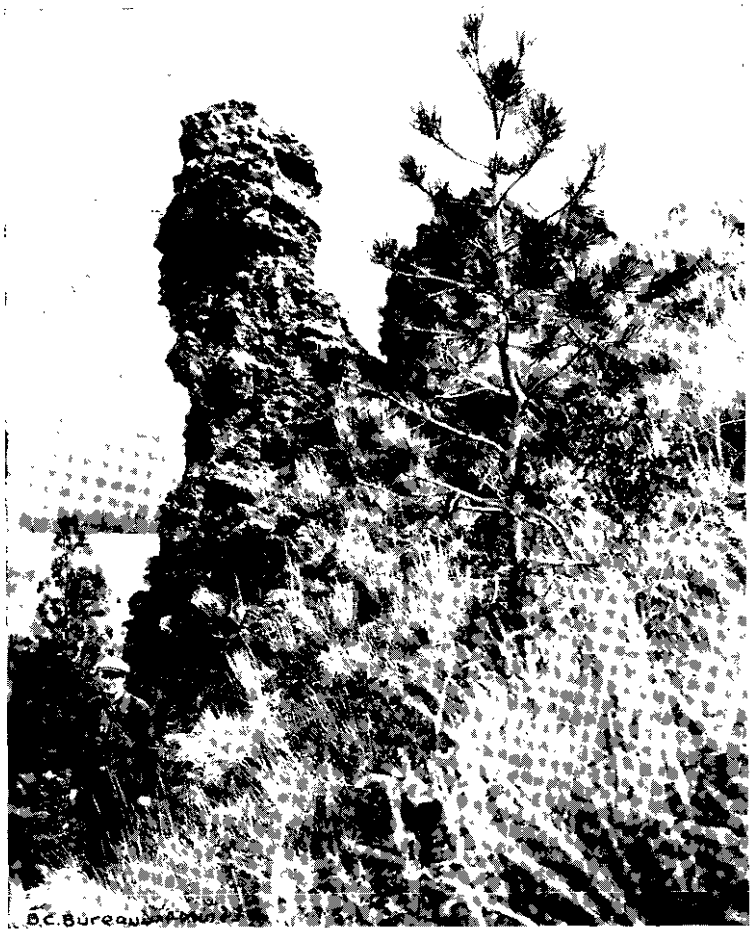
Nothing is known of the structure of the coal-basin except near the outcrop. Along the west bank of Hat creek between drill-hole No. 2 and drill-hole No. 5 the beds have a uniform strike of N. 160° E. (ast.) and dip westward into the bank at angles of about 65° to 70°. This structure holds throughout tunnel No. 1, with the exception of a narrow fault-zone 15 feet from the tunnel entry. In tunnel No. 2 the beds are folded into two synclines which are separated by a compressed and faulted anticline. The axes of these folds strike N. 170° E. (ast.) and plunge 10° S. It was found impossible to correlate the beds in the two tunnels, this being probably due in a large measure to the southward plunge of the folds bringing the beds exposed in No. 2 tunnel beneath those of No. 1 tunnel.

At the open-cut near No. 1 drill-hole the measures strike N. 25° E. and dip 35° S.E., whereas on the bank 200 feet to the west and 50 feet distant from an old shaft the beds strike N. 130° E. and dip 65° S.W. This divergence of dip is considered as due to folding and faulting at the northern extremity of the coal-basin, similar to that observed in tunnel No. 2.

The deposit proven is exceptionally thick. Tunnel No. 1 pierced 154 feet of beds, of which 108 feet was clean coal, 35 feet was shaly coal, and 12 feet was shale; neither hanging-wall rock nor foot-wall rock was encountered. No. 2 tunnel cut through 76 feet of beds without encountering either wall-rock. Of this, 38 feet was clean coal, 26 feet was shaly coal, and 12 feet was shale and clay. The thicknesses of clean coal, shaly coal, and shale and clay pierced in the several drill-holes are shown in the accompanying tabulated statements compiled from the blue-print of drill-logs prepared by the British Columbia Department of Railways. One of these shows a thickness of 269 feet 8 inches of clean coal. Similar detailed sections of the beds observed in tunnels No. 1 and No. 2 are also appended. It is of interest to note the entire absence of sandy beds among those separating the coal.



Hat Creek Coal-seam.



Volcanic Dyke. Hat Creek.

Section of Beds (in Descending Order) in Bore-hole No. 2.

Remarks.	Thickness.	Character of Beds.		
		Coal.	Shaly Coal.	Rock.
	Ft. In.			
Section exposed in cut-bank of Hat Creek	20 0		Shaly coal	
	26 0		Shaly coal	
	42 0	Coal		
	3 0			Dirt.
	17 6	Coal		
	0 6			Shale.
	11 0	Coal		
	5 0			Clay and shale.
	23 0	Coal		
	4 0			Shale.
	4 0	Coal		
	3 0			Shale.
	1 0	Coal		
	8 0			Shale.
	6 0	Coal		
	6 0			Shale.
	10 0	Coal		
	2 0			Shale.
	5 0	Coal		
	1 0			Shale.
	2 0	Coal		
	26 0			Shale.
	10 0	Coal		
	18 0			Shale.
	2 0	Coal		
	2 0			Shale.
	3 0	Coal		
	7 0			Shale.
	26 0	Coal		
	6 0		Shaly coal	
	8 0	Coal		
	4 0			Shale.
	211 0	Coal		
	22 0			Shale.
	25 0			Clay.
	35 0			Sand.
	605 0	381′ 6″	52′ 0″	171′ 6″
Assuming strata to dip 45°, thickness of beds	427 8	269′ 8″	36′ 9″	121′ 3″
Total combined thickness of shaly and clean coal		306′ 5″		

Section of Beds (in Descending Order) in Bore-hole No. 4.

Remarks.	Thickness.	Character of Beds.		
		Coal.	Shaly Coal.	Rock.
	Ft. In.			
	31 0			Boulders and gravel.
	80 0		Shaly coal	
	10 0			Shale.
	26 0		Shaly coal	
	2 0			Clay.
	116 0		Shaly coal	
	20 0			Shale.
	20 0	Coal		
	60 0		Shaly coal	
	30 0		65% to 75% coal	
	13 0		75% coal	
	7 0			Shale.
	10 0	Coal		
	20 0		Shaly coal	
	30 0	Coal		
	52 6		Shaly coal	
	7 6			Shale.
	60 0		Shaly coal	
	2 0			Shale.
	18 0		Shaly coal	
	20 0			Shale.
Assuming strata to dip 60°, thickness of beds	635 0	60′	475′ 6″	99′ 6″
	317 6	30′	237′ 9″	49′ 9″
Combined thickness of shaly and clean coal		267′ 9″		
Add section in cut-bank	88 0	21′	23′ 0″	
Total thickness of beds	405 6	51′	260′ 9″	49′ 9″
Total combined thickness of shaly and clean coal in bore-hole and in cut-bank		311′ 9″		

Section of Beds (in Descending Order) in Bore-hole No. 5.

	Ft. In.			
	10 0			Sand and gravel.
	4 0			Boulders.
	13 0			Gravel and boulders.
	15 0		Shaly coal	
	3 0	Coal		
	28 0		Shaly coal	
	3 0	Coal		
	30 0		Shaly coal	
	24 0		Shaly coal	
	3 0	Coal		
	12 0		Broken coal	
	10 0	Coal		
	10 0		Shaly coal	
	10 0		Shaly coal	
	74 0		Broken coal	
	6 0			Shale.
	10 0			No core recovered.
	10 0		Shaly coal	
	30 0		Shaly coal	
	10 0		Ground up coal-dust	
	20 0		Shaly coal	
Total	335 0	19′ 0″	273′ 0″	43′ 0″
Assuming strata to dip 60°, thickness of beds	167 6	9′ 6″	136′ 6″	21′ 6″
Combined thickness of shaly and clean coal in hole		146′ 0″		
Add section in cut-bank	88 0	21′ 0″	23′ 0″	
Total thickness of beds	255 6	30′ 6″	159′ 6″	21′ 6″
Total combined thickness of shaly and clean coal in hole and cut-bank		190′		

Section of Beds (in Descending Order) in Bore-hole No. 6.

Remarks.	Thickness.	Character of Beds.		
		Coal.	Shaly Coal.	Rock.
	Ft. In.			
	9 0			Dirt.
	9 0		Shaly coal	
	17 0			Coal and sand.
	6 0		Shaly coal	
	20 0		Shaly coal	
	4 0		Shaly coal	
	10 0	Coal		
	18 0			Shale and clay.
	2 0	Coal		
	22 0			Clay.
	2 0	Coal		
	6 0		Shaly coal	
	5 0			Shale.
	2 0	Coal		
	28 0		Shaly coal	
	3 0			Clay.
	7 0		Shaly coal	
	15 0			Shale and clay.
	2 0	Coal		
	2 0			Rock.
	19 0			Shale and clay.
	15 0			Sandstone.
	9 0			Clay.
	7 0	Coal		
	16 0			Shale and clay.
	15 0	Coal		
	10 0		Shaly coal	
	9 0			Shale and clay.
	3 0	Coal		
	10 0			Shale and clay.
	25 0	Coal		
	12 0			Shale and clay.
	15 0	Coal		
	2 0			Clay.
	8 0	Coal		
	6 0			Shale and clay.
	6 0	Coal		
	14 0			Shale and clay.
	18 0			Clay.
	7 0	Coal		
	7 0		Coal and clay	
	9 0			Shale.
	13 0	Coal		
	4 0			Shale.
	56 0	Coal		
Total	504 0	173′	97′	234′
Total combined thickness of shaly and clean coal, assuming beds to be horizontal, as dip is undetermined		270′		

Section of Beds (in Descending Order) in Tunnel No. 1.

Remarks.	Thickness.	Character of Beds.		
		Coal.	Shaly Coal.	Rock.
	Ft. In.			
	1 5	Coal		
	1 0			Clay.
	1 2	Coal		
	0 6		Shaly coal	
	4 3	Coal		
	0 5			Shale.
	0 2	Coal		
	0 6			Shale.
	0 9		Dirty coal	
	2 0	Coal		
	0 3		Shaly coal	
	0 3	Coal		
	0 7		Shaly coal	
	5 11	Coal		
	0 4		Shaly coal	
	5 0	Coal		
	0 4		Dirty coal	
	4 7	Coal		
	0 4			Clay.
	1 6	Coal		
	0 4			Clay.
	0 6		Shaly coal	
	2 11	Coal		
	0 3		Shaly coal	
	0 5	Coal		
	0 4			Shale.
	0 10	Coal		
	0 5			Shale.
	4 7	Coal		
	4 3		Shaly coal	
	0 6		Dirty coal	
	3 9	Coal		
	0 6		Dirty coal	
	15 6	Coal		
	0 7			Shale.
	0 10	Coal		
	0 3		Shaly coal	
	3 4	Coal		
	0 5		Dirty coal	
	1 6		Shaly coal	
	0 5			Clay.
	0 11		Shaly coal	
	0 8		Dirty coal	
	4 3	Coal		
	0 11		Dirty coal	
	0 7			Clay.
	3 10	Coal		
	0 4			Shale.
	1 4		Dirty coal	
	0 2			Shale.
	1 9	Coal		
	0 3			Clay.
	3 5	Coal		
	0 2		Dirty coal	
	2 7	Coal		
	3 3		Dirty coal	
	0 5			Shale.
	0 4	Coal		
	0 5			Shale.
	4 10	Coal		
	0 2			Shale.

Section of Beds (in Descending Order) in Tunnel No. 1—Continued.

Remarks.	Thickness.	Character of Beds.		
		Coal.	Shaly Coal.	Rock.
	Ft. In.			
	0 4	Coal		
	0 4			Shale.
	2 8	Coal		
	0 6		Dirty coal	
	0 3	Coal		
	0 5		Shaly coal	
	0 3	Coal		
	0 4		Shaly coal	
	0 5	Coal		
	0 2			Shale.
	1 2	Coal		
	0 3			Shale.
	2 3	Coal		
	0 7			Shale.
	1 0		Dirty coal	
	0 4	Coal		
	0 7		Dirty coal	
	1 2	Coal		
	0 3			Shale.
	0 9	Coal		
	0 2			Shale.
	0 6	Coal		
	0 3			Shale.
	6 6	Coal		
	0 5		Dirty coal	
	3 8	Coal		
	0 8		Dirty coal	
	0 10	Coal		
	0 3		Dirty coal	
	0 8		Dirty coal	
	2 0			Shale.
		Fault	of undetermined th	row.
	5 0	Coal		
			Fault	
	0 5		Shaly coal	
	1 0	Coal		
	0 4			Shale.
	1 0	Coal		
	0 4			Shale.
	0 7	Coal		
	0 6			Shale.
	11 7		Shaly coal	
Thickness of beds	154 11	108′ 1″	35′ 0″	11′ 10″
Total thickness of shaly and clean coal		143′ 1″		

Section of Beds (in Descending Order) in Tunnel No. 2 (disregarding Throw in Fault).

Remarks.	Thickness.	Character of Beds.		
		Coal.	Shaly Coal.	Rock.
	Ft. In.			
	0 6			Clay.
	3 4	Coal		
	0 4			Shale.
	1 4	Coal		
	0 5			Shale.
	0 7	Coal		
	0 3			Shale.
	0 3	Coal		
	0 9			Shale.
	0 5	Coal		
	0 4			Shale.
	6 0	Coal		
	1 4			Clay.
	0 8		Shaly coal	
	0 2			Clay.
	3 4	Coal		
		Fault of undetermined throw.		
	3 10	Coal		
	0 2		Shaly coal	
	2 10	Coal		
	0 2			Clay.
	2 4		Shaly coal	
	3 4	Coal		
	2 0		Shaly coal	
	0 2			Clay.
	0 3	Coal		
	0 2			Clay.
	3 0	Coal		
	0 4		Dirty coal	
	1 0	Coal		
	0 5			Clay.
	1 0	Coal		
	1 1		Shaly coal	
	1 0	Coal		
	0 5			Clay.
	0 10	Coal		
	0 3			Clay.
	0 9		Dirty coal	
	0 3			Clay.
	0 8	Coal		
	0 7			Clay.
	0 4		Dirty coal	
	0 2			Clay.
	0 3	Coal		
	0 11			Clay.
	0 10		Dirty coal	
	0 1			Clay.
	1 0	Coal		
	0 3			Clay.
	0 10		Dirty coal	
	0 4			Clay.
	0 6	Coal		
	0 3			Clay.
	2 6	Coal		
	0 10			Clay.
	2 4	Coal		
	2 10		Dirty coal	
	0 8			Clay.
	3 0		Shaly coal	
	0 5			Clay.
	10 6		Shaly coal	
Thickness of beds	72 4	37′ 7″	25′ 3″	9′ 1″
Total combined thickness of shaly and clean coal		63′ 3″		

QUANTITY OF COAL.

Although the development-work has contributed considerable data on the character, thickness, and structure of the coal-deposit, it is not sufficiently advanced to allow of an accurate estimate of the total tonnage of coal present. If the measures lay uniformly over the area exploited this would be easy of solution, but in their folded and faulted condition as evidenced in tunnel No. 2 and by the divergence of strike near the open-cut the problem cannot be solved with the data at hand. Coal was encountered in only four of the seven holes put down, and in one of these (bore-hole No. 6) the writer has no means of determining the strike and dip of the measures. It is unfortunate, also, that bore-hole No. 6, which was terminated in coal, was not deepened sufficiently to prove the thickness of the deposit, or that tunnels Nos. 1 and 2 were not driven far enough to encounter the rock wall. Moreover, three of these bore-holes lie close to the coal-outcrop along the creek, as do the shafts, tunnels, and open-cut, and consequently a much smaller area has been proven than would otherwise have been the case. As it is, the area underlain by coal as determined by the development-work is less than 100 acres, although there is little doubt that many times this acreage of the adjoining territory is coal-bearing. Under the existing conditions the nearest estimate of tonnage that can be advanced is by assuming the area exploited to be underlain by the average thickness of coal as determined in the four drill-holes and two tunnel sections. This is doubtless a minimum estimate. For calculation purposes these are listed below:—

	Combined Thickness of Shaly and Clean Coal.		Thickness of Clean Coal.	
	Ft.	In.	Ft.	In.
No. 2 drill-hole and cliff exposure	306	5	269	3
No. 4 drill-hole and cliff exposure	311	9	51	0
No. 5 drill-hole and cliff exposure	190	0	30	6
No. 6 drill-hole and cliff exposure	270	0	173	0
No. 1 tunnel, disregarding throw in fault	143	1	108	1
No. 2 tunnel, disregarding throw in fault	63	3	37	7
	1,284	6	669	10
Average thickness	213	1	111	5

Hat Creek lignite has a specific gravity of 1.25 and, therefore, a weight of approximately 1,500 long tons per acre-foot. On the assumption that the above average thicknesses underlie the 100 acres, the contained tonnage of coal proven would be as follows: That of combined shaly and clean coal=100 (acres)×213 (feet thickness)×1,500 (tons per acre-foot)=31,950,000 tons; that of clean coal=100 (acres)×112 (feet thickness)×1,500 (tons per acre-foot)=16,800,000 tons. Most of this tonnage lies below creek-level.

Dr. Dowling estimated the *probable* tonnage of the deposit at 68,000,000 tons, assuming an average thickness of 68 feet of coal over an area of 2 square miles. In the absence of outcrops the extent of the deposit can only be determined by intelligent and systematic drilling. It is highly probable that a considerable part of the coal-measures is covered by volcanic flow rock.

QUALITY OF COAL.

Hat Creek coal has a dark brown to black colour and a dull resinous lustre. Hand specimens of the clean coal show alternating layers and lenses of bright and dark material, which range in thickness from microscopic size to several inches. The bright layers represent that part of the coal derived from wood and the dull portions the parts made up of debris. On drying, the coal breaks with a conchoidal fracture into small, irregular blocks, which on exposure to the weather further disintegrate, yielding very little lump. The coal does not soil the fingers on handling. On firing, it steams and sweats until the excess moisture is driven off, after which it burns with a bright-yellow flame. Parts of the coal are characterized by small lenses, globules, and irregular-shaped masses of light-yellow semi-transparent fossilized amber or retinite. Much of the coal shows highly polished slickensided surfaces, whereas other parts are made up of small angular fragments of amorphous coal partially or completely surrounded by a calcareous mud. Much of the coal is thus rendered valueless. Carbonated tree-trunks occur in several horizons and these in some instances have been converted into ironstone.

In sampling the deposit an attempt was made to obtain the average run of coal in the deposit and the best grade of coal. As no opportunity was afforded the writer to obtain samples from the drill-cores, the sampling was confined to tunnel sections. In all, ten samples were taken; eight channel samples and two selected samples. The former were carefully obtained by chiselling a groove 2 inches in width across the clean and shaly coal, omitting as far as possible all excessively dirty coal, shales, and clay-beds. The resulting sample, amounting in some instances to over 50 lb. weight, was crushed and quartered down to a weight of about 3 lb. The two selected samples, each in lumps of about 3 lb. weight, were chosen from the faces, which appeared to represent the best grade of clean coal in each of the tunnels. All these samples were shipped to the Mines Branch, Department of Mines, Ottawa, for analyses in air-tight containers, thus making it possible to have the coal analysed on the three bases: (1) With full moisture content as mined; (2) on an air-dried basis; and (3) on a dry basis, as shown in the accompanying tabulation. It is now accepted practice to analyse coal with its moisture content as mined, although under normal conditions the consumer will receive a drier coal. As the writer has made use of all the analyses at his disposal, including both those obtained from the British Columbia Department of Mines and those furnished by the Hat Creek Coal Company, Limited, and as most of these were made on air-dried samples, the air-dried basis is adopted for their tabulation and comparison.

The fifty-eight analyses made use of have been assembled in two groups, one embracing twenty-eight analyses of tunnel samples, and the other, thirty analyses of drill-core samples, the average analysis of each set and the total average of each group being shown. The final average of the two groups may be considered to represent the true chemical composition of the proven coal. On reference to the table of analyses of tunnel samples and the plate of tunnel sections it may be seen that samples 3, 4, and 5 combined, taken by the writer, cover practically the entire length of tunnel No. 2; hence their average analysis, which is also given, should correspond closely with the analyses of sample No. 4 taken by the British Columbia Department of Mines, or the average analysis of tunnel No. 2 full length obtained by that Department. The excessively high ash content in Geological Survey sample No. 1 and sample No. 6 of the British Columbia Department of Mines taken at face of No. 2 tunnel is in all probability due to the proximity of the face sampled to the underlying clay-bed.

TEN SAMPLES OF HAT CREEK COAL, COLLECTED BY R. B. MACKAY AND ANALYSED BY MINES BRANCH, DEPARTMENT OF MINES, OTTAWA.

Channel Samples No. 1 and No. 2.

Laboratory No.	3344			3345		
Sample-mark	1			2		
Condition of sample	As Received.	Air-dried.	Dry Basis.	As Received.	Air-dried.	Dry Basis.
Proximate analysis—						
Moisture, per cent	28.2	11.2	.....	26.0	15.1	.....
Ash, per cent	33.6	41.5	46.7	21.9	25.2	29.7
Volatile matter, per cent	20.7	25.6	28.8	27.3	31.3	36.8
Fixed carbon (by difference), per cent	17.5	21.7	24.5	24.8	28.4	33.5
Sulphur, per cent	0.7	0.9	1.0	0.8	0.9	1.0
Calorific value—						
Determined in calories per gram, gross	2,390	2,960	3,330	3,560	4,080	4,810
Determined in B.T.U. per lb., gross	4,300	5,325	6,000	6,400	7,350	8,650
Fuel ratio, fixed carbon/volatile matter	.....	.....	0.85	.....	.....	0.91
Coking properties: Non-coking.						

Channel Sample No. 1 (3344)= Sample taken across 4 foot face at end of No. 2 tunnel.
Channel Sample No. 2 (3345)= Sample taken across 7 foot face of 25-foot drift north side No. 2 tunnel.

Channel Samples No. 3 and No. 4.

Laboratory No.	3346			3347		
Sample-mark	3			4		
Condition of sample	As Received.	Air-dried.	Dry Basis.	As Received.	Air-dried.	Dry Basis.
Proximate analysis—						
Moisture, per cent	30.4	13.1	.....	29.5	13.9	.....
Ash, per cent	22.8	28.5	32.8	20.1	24.6	28.5
Volatile matter, per cent	24.2	30.2	34.7	26.8	32.7	38.0
Fixed carbon (by difference), per cent	22.6	28.2	32.5	23.6	28.8	33.5
Sulphur, per cent	1.0	1.2	1.4	1.0	1.2	1.4
Calorific value—						
Determined in calories per gram, gross	3,115	3,885	4,470	3,400	4,150	4,820
Determined in B.T.U. per lb., gross	5,605	6,990	8,050	6,120	7,470	8,670
Fuel ratio, fixed carbon/volatile matter	.....	.....	0.93	.....	.....	0.88

Channel Sample No. 3 (3346)= Sample taken across measures in No. 2 tunnel from centre of syncline, 75 feet from mouth, to end of tunnel, 105 feet from mouth.

Channel Sample No. 4 (3347)= Sample taken from centre of syncline in No. 2 tunnel from point 75 feet from tunnel-mouth to centre of anticline, 57 feet from mouth.

Channel Sample No. 5 and Selected Sample No. 6.

Laboratory No.	3348			3349		
Sample-mark	5			6		
Condition of sample	As Received.	Air-dried.	Dry Basis.	As Received.	Air-dried.	Dry Basis.
Proximate analysis—						
Moisture, per cent	24.8	16.2	.....	26.1	17.3	.....
Ash, per cent	15.8	17.6	21.0	10.6	11.9	14.3
Volatile matter, per cent	29.7	33.1	39.5	31.5	35.3	42.7
Fixed carbon (by difference), per cent	29.7	33.1	39.5	31.8	35.5	43.0
Sulphur, per cent	0.8	0.9	1.1	0.6	0.7	0.8
Calorific value—						
Determined in calories per gram, gross	3,990	4,440	5,300	4,480	5,015	6,060
Determined in B.T.U. per lb., gross	7,180	7,990	9,540	8,060	9,030	10,910
Fuel ratio, fixed carbon/volatile matter	.....	.....	1.00	.....	.....	1.00
Coking properties: Non-coking.						

Channel Sample No. 5 (3348)= Sample taken across coal-seam from centre of syncline in No. 2 tunnel, 50 feet from entry to mouth.

Selected Sample No. 6 (3349)= Choicest coal to be found in No. 2 tunnel, taken in drift on north side of tunnel, 45 feet in from mouth.

Channel Sample No. 7 and Selected Sample No. 8.

Laboratory No.	3350			3351		
Sample-mark	7			8		
Condition of sample	As Received.	Air-dried.	Dry Basis.	As Received.	Air-dried.	Dry Basis.
Proximate analysis--						
Moisture, per cent	34.2	18.5	.....	39.4	18.3	.....
Ash, per cent	10.9	13.5	16.6	3.2	4.3	5.2
Volatile matter, per cent	24.2	30.0	36.8	24.7	33.3	40.8
Fixed carbon (by difference), per cent	30.7	38.0	46.6	32.7	44.1	54.0
Sulphur, per cent	0.9	1.1	1.4	0.5	0.7	0.9
Calorific value—						
Determined in calories per gram, gross	3,670	4,540	5,580	3,930	5,310	6,495
Determined in B.T.U. per lb., gross	6,600	8,180	10,040	7,080	9,600	11,690
Fuel ratio, fixed carbon/volatile matter	.....	.....	1.25	.....	.....	1.30
Coking properties: Non-coking.						

Channel Sample No. 7 (3350)= Sample taken across 7-foot face of No. 1 tunnel, 168 feet from mouth.

Selected Sample No. 8 (3351)= Choicest coal to be found in No. 1 tunnel taken at face of workings, 168 feet from mouth of tunnel.

Channel Samples No. 9 and No. 10.

	3352			3353		
Laboratory No.						
Sample-mark	9			10		
Condition of sample	As Received.	Air-dried.	Dry Basis.	As Received.	Air-dried.	Dry Basis.
Proximate analysis—						
Moisture, per cent	29.6	17.0	.....	26.2	15.9	.....
Ash, per cent	15.5	18.3	22.1	21.3	24.3	28.9
Volatile matter, per cent	26.5	31.2	37.6	26.2	29.8	35.5
Fixed carbon (by difference), per cent	28.4	33.5	40.3	26.3	30.0	35.6
Sulphur, per cent	0.4	0.5	0.6	0.5	0.6	0.7
Calorific value—						
Determined in calories per gram, gross	3,740	4,410	5,315	3,500	3,980	4,730
Determined in B.T.U. per lb., gross	6,730	7,940	9,570	6,290	7,170	8,520
Fuel ratio, fixed carbon/volatile matter	.....	.....	1.05	.....	.....	1.00
Coking properties: Non-coking.						

Channel Sample No. 9 (3352)= Sample taken across 9-foot face of 18-foot drift run in on north side of No. 1 tunnel.

Channel Sample No. 10 (3353)= Sample taken along No. 1 tunnel from mouth to face, 168 feet distant.

Twenty-five Analyses of Hat Creek Coal made by D. E. Whittaker, British Columbia Provincial Government Assayer, including Twenty-three Bore-hole Cores and Two Tunnel Averages.

Certificate No. 7830 A, etc.

BUREAU OF MINES,
VICTORIA, B.C., July 24th, 1925.

GOVERNMENT ASSAY OFFICE.

Assay Certificate.

I hereby certify that I have assayed the following samples handed me by the Chief Inspector of Mines, Victoria, and said to represent coal from Hat Creek coal-deposit.

I find the same to contain, in dried sample:—

Depositor's Mark.	Description of Sample.	Moist.	V.C.M.	F.C.	Ash.	B.T.U.
		%	%	%	%	
7830 A	No. 1, No. 2 bore-hole, 104 feet deep	20.5	32.5	44.7	2.3	9,765
7831 A	No. 2, No. 2 bore-hole, 145 feet deep	18.6	26.4	35.7	19.3	7,440
7832 A	No. 3, No. 2 bore-hole, 250 feet deep	20.0	27.5	41.3	11.2	.....
7833 A	No. 4, No. 2 bore-hole, 305 feet deep	18.5	32.8	40.3	8.4	.....
7834 A	No. 5, No. 2 bore-hole, 350 feet deep	19.7	31.3	41.9	7.1	.....
7835 A	No. 6, No. 2 bore-hole, 400 feet deep	19.5	30.5	42.4	7.6	.....
7836 A	No. 7, No. 4 bore-hole, 50 feet deep	20.2	32.2	39.3	8.3	.....
7837 A	No. 8, No. 4 bore-hole, 89 feet deep	18.0	33.5	41.5	7.0	.....
7838 A	No. 9, No. 4 bore-hole, 125 feet deep	20.9	30.1	39.1	9.9	.....
7839 A	No. 10, No. 4 bore-hole, 175 feet deep	20.1	31.9	39.9	8.1	.....
7840 A	No. 11, No. 4 bore-hole, 240 feet deep	18.4	30.1	37.4	14.1	.....
7841 A	No. 12, No. 4 bore-hole, 290 feet deep	20.9	31.1	39.3	8.7	.....
7842 A	No. 13, No. 4 bore-hole, 340 feet deep	19.2	28.3	37.8	14.7	8,370
7843 A	No. 14, No. 4 bore-hole, 385 feet deep	20.0	29.7	41.7	8.6	.....
7844 A	No. 15, No. 4 bore hole, 445 feet deep	19.0	30.5	41.4	9.1	.....
7845 A	No. 16, No. 4 bore-hole, 490 feet deep	15.0	30.8	41.1	13.1	.....
7846 A	No. 17, No. 4 bore-hole, 530 feet deep	20.0	31.9	42.1	16.0	9,222
7847 A	No. 18, No. 4 bore-hole, 560 feet deep	20.9	29.0	41.4	8.7	.....
7848 A	No. 19, No. 5 bore-hole, 65 feet deep	17.4	32.7	38.8	11.1	.....
7849 A	No. 20, No. 5 bore-hole, 132 feet deep	15.3	33.8	38.8	12.1	.....
7850 A	No. 21, No. 5 bore-hole, 184 feet deep	19.2	32.1	46.7	2.0	9,780
7851 A	No. 22, No. 5 bore-hole, 240 feet deep	17.1	31.0	42.8	9.1	.....
7852 A	No. 23, No. 5 bore-hole, 305 feet deep	16.8	27.2	31.9	24.1	7,100
7853 A	No. 24, average taken from full length of old No. 1 tunnel	19.3	32.3	37.0	11.4	8,420
7854 A	No. 25, average taken from full length of new No. 2 tunnel	14.4	31.0	34.5	20.1	7,900
	Average of above twenty-five analyses	18.2	30.4	41.2	10.2	8,499*

* Average of 8 B.T.U. analyses.

D. E. WHITTAKER,
Provincial Government Assayer.

Coal Analyses supplied by Hat Creek Coal Company.

Analyses by G. S. Eldridge & Co., Consulting Engineers, Vancouver.

Description of Sample.	S.	Moist.	V.M.	F.C.	Ash.	B.T.U.
	%	%	%	%	%	
May 13. Sample 18′ (evidently refers to distance from portal of No. 1 tunnel?)	0.51	16.30	33.73	39.89	10.08	10,600
May 13. Sample 45′ (evidently refers to distance from portal of No. 1 tunnel?)	0.56	16.12	33.76	38.18	11.94	10,360
May 15. Sample (evidently from No. 1 tunnel)	.....	12.25	35.84	41.17	10.74	.....
May 19. Sample No. 2, drill-hole, depth 309 feet	0.30	7.19	40.85	44.12	7.84	11,900
May 26. Sample, air-dried basis	0.44	8.52	43.30	44.18	4.00	12,240
June 17. Tunnel sample, air-dried basis	.....	13.38	28.42	40.58	17.62	.....
June 30. Sample No. 4, drill-hole, 330 feet depth, air-dried basis	0.27	9.74	38.82	46.40	5.04	11,830
June 30. Sample No. 4, drill-hole, 470 feet depth, air-dried basis	0.35	9.17	38.83	44.46	7.54	11,480
Average of above 8 analyses	0.40	11.58	36.69	42.24	9.35	11,401

Analyses by Macdonald & Macdonald, Inspecting and Testing Engineers, Vancouver.

Aug. 17. Sample No. 4. 340′ size 4½″ by 1 21/32″ (apparently drill-hole No. 4, depth 340 feet). Moisture as received, 17.95	.....	8.24	39.06	40.15	12.55	12,195
Aug. 17. Sample No. 2, 104′ size 5¼″ by 1⅝″ (apparently drill-hole No. 2, depth 104 feet). Moisture as received, 18.61	.....	8.79	41.65	41.22	8.34	12,214
Average of above two analyses	.....	8.51	40.35	40.68	10.45	12,204

Analysis by J. R. Williams, Provincial Assayer, Vancouver.

Sept. 18. Sample lignite—drill-core	.....	18.00	33.05	38.15	10.80	9,100

Comparison of Twenty-eight Analyses of Tunnel Samples.

Description of Sample.	Moist. Loss.	Air-dried.					
		Moist.	V.C.M.	F.C.	Ash.	S.	B.T.U.
	%	%	%	%	%	%	
No. 1, No. 2 tunnel, face	7.0	11.20	25.60	21.70	41.50	0.90	5,325
No. 2, No. 2 tunnel, face of room	11.0	15.10	31.30	28.40	25.20	0.90	7,350
No. 3, No. 2 tunnel, W. limb syncline	17.3	13.10	30.20	28.20	28.50	1.20	6,990
No. 4, No. 2 tunnel, E. limb syncline	15.6	13.90	32.70	28.80	24.60	1.20	7,470
No. 5, No. 2 tunnel, portal to 50 feet in tunnel	8.6	16.20	33.10	33.10	17.60	0.90	7,990
Average 3, 4, and 5=right rib, No. 2 tunnel	13.8	14.40	32.00	30.00	23.50	1.10	7,483
No. 6, No. 2 tunnel, room, selected sample	8.8	17.30	35.30	35.30	11.90	0.70	9,030
No. 7, No. 1 tunnel (old), face	15.7	18.50	38.00	38.00	13.50	1.10	8,180
No. 8, No. 1 tunnel, face, selected sample	21.1	18.30	44.10	44.10	4.30	0.50	9,600
No. 9, No. 1 tunnel, face of room	12.6	17.00	33.50	33.50	18.30	0.60	7,940
No. 10, No. 1 tunnel, along right rib	10.3	15.90	30.00	30.00	24.30	0.60	7,170
Average of 10 analyses	12.8	15.60	31.30	32.20	21.00	0.80	7,704

Above samples taken by Geological Survey, Department of Mines, Ottawa. Analysed by Mines Branch, Department of Mines, Ottawa.

No. 1, No. 1 tunnel, face of room	13.1	15.80	30.70	33.50	20.00	0.60	7,920
No. 2, No. 1 tunnel, along right rib	10.8	15.40	31.00	31.60	22.00	0.60	7,550
No. 3, No. 1 tunnel, face	16.9	18.50	32.50	39.90	7.70	1.00	9,000
No. 4, No. 2 tunnel, along right rib	12.9	14.40	31.20	28.50	25.90	1.10	7,210
No. 5, No. 2 tunnel, face of room	10.4	15.30	32.30	31.70	20.70	0.70	7,950
No. 6, No. 2 tunnel, face	16.8	12.30	26.10	22.70	38.90	1.00	5,710
Average of 6 analyses	13.5	15.30	30.60	31.30	22.50	0.80	7,556
Average of 16 analyses	13.7	15.50	31.20	31.90	21.40	0.80	7,649

Above samples taken by B.C. Department of Mines. Analysed by Mines Branch, Department of Mines, Ottawa.

Comparison of Twenty-eight Analyses of Tunnel Samples—Continued.

Description of Sample.	Moist. Loss.	Air-dried.					
		Moist.	V.C.M.	F.C.	Ash.	S.	B.T.U.
	%	%	%	%	%	%	
No. 1, No. 1 tunnel, face of room	8.0	21.40	28.20	32.30	18.10	.....	.....
No. 2, No. 1 tunnel, along right rib	6.4	19.10	28.40	31.60	20.90	.....	.....
No. 3, No. 1 tunnel, face	9.3	25.70	28.10	39.00	7.20	.....	.....
No. 4, No. 2 tunnel, along right rib	9.3	17.10	30.60	31.30	21.00	.....	.....
No. 5, No. 2 tunnel, face of room	8.5	17.70	30.50	31.80	20.00	.....	.....
No. 6, No. 2 tunnel, face	14.2	15.50	22.50	23.70	38.30	.....	.....
Average of 6 analyses	9.3	19.40	28.10	31.60	20.90	.....	.....
Average tunnel No. 1, full length	.....	19.30	32.30	37.00	11.90	.....	8,420
Average tunnel No. 2, full length	.....	14.40	31.00	34.50	20.10	.....	7,900
Average of 24 analyses	12.5	16.60	30.40	32.10	20.80	.....	7,706*

Above samples taken by B.C. Department of Mines. Analysed by B.C. Department of Mines.

No. 1, No. 1 tunnel (old), 18 feet in from portal	.....	16.30	33.72	39.89	10.08	0.51	10,600
No. 2, No. 1 tunnel (old), 45 feet in from portal	.....	16.12	33.76	38.18	11.34	0.56	10,360
No. 3, Tunnel sample	.....	12.25	35.84	41.17	10.74	.....	.....
No. 4, Tunnel sample	.....	13.38	28.42	40.58	17.62	.....	.....
Average of 4 analyses	.....	14.51	32.93	39.95	12.60	.....	10,480
Average of 28 analyses	.....	16.30	30.80	33.20	18.10	.....	7,983†

Above samples analysed by Eldridge & Co., for Hat Creek Coal Company, Limited.
* Average of 18 B.T.U. analyses. † Average of 20 B.T.U. analyses.

Comparison of Averages of Thirty Analyses of Drill-cores (Dried Samples).

Description.	Moist.	V.M.	F.C.	Ash.	B.T.U.
	%	%	%	%	
Average of 23 drill-core analyses taken and analysed by B.C. Department of Mines	18.92	30.73	40.31	10.46	8,613*
Average of 4 drill-core analyses by G. S. Eldridge & Co. for Hat Creek Coal Co., Ltd	8.65	40.45	44.79	6.10	10,480
Average of 2 drill-core analyses by Macdonald & Macdonald for Hat Creek Coal Co., Ltd	8.51	40.35	40.68	10.45	12,204
Analyses of drill-core by J. R. Williams for Hat Creek Coal Co., Ltd	18.00	33.05	38.15	10.80	9,100
Average of 30 drill-core analyses	16.83	32.75	40.86	9.89	10,203†

Combined Average of Fifty-eight Analyses of Tunnel and Drill-core Samples.

Average of 28 tunnel analyses	16.30	30.80	33.20	18.10	7,983‡
Average of 30 drill-core analyses	16.80	32.80	40.90	9.90	10,203
Average of 58 analyses	16.60	31.80	36.70	15.10	8,857§

* Average of 6 B.T.U. analyses. † Average of 13 B.T.U. analyses. ‡ Average of 20 B.T.U. analyses. § Average of 33 B.T.U. analyses.

A specimen of Hat Creek lignite collected in 1877 by Dr. G. M. Dawson and analysed by Dr. B. J. Harrington gave the following:—

	Moist.	V.M.	F.C.	Ash.
	%	%	%	%
By slow coking	8.6	35.31	46.84	9.05
By fast coking	8.6	41.42	40.93	9.05

The calorific value of the coal was not determined.

On comparison it will be noted that the moisture content as determined by Harrington is just about half the average moisture content of the fifty-eight analyses of air-dried samples. The logical inference is that Dawson's specimen had become super-dried while in the office before being submitted for analysis. Otherwise the analysis compares closely with that of the two selected specimens taken by the writer from the face of tunnel No. 1 and from the room off tunnel No. 2, which are considered to represent the best grade of coal in the deposit.

CLASSIFICATION OF HAT CREEK COAL.

The average chemical composition and heat value of Hat Creek coal, together with its physical characteristics, determine it to be a lignite. Apparently on the basis of fuel ratio (quotient of fixed carbon divided by the volatile matter of the proximate analysis) and the low moisture content determined by Harrington, Dowling rated Hat Creek coal in Memoir 59, Coalfields of Canada, as of sub-bituminous rank. In classifying low-rank coals, however, fuel ratio is not the determining factor, and physical criteria must be taken into consideration along with chemical composition, whereas the moisture content as determined by Harrington is without doubt excessively low. In regard to its heat value, its high moisture content, and its physical appearance, Hat Creek coal differs materially from any of the typical black, shiny sub-bituminous coals of western Alberta and resembles much more closely the dull lignite coals of the central part of that Province. On an ash-free and moisture-free basis it compares quite favourably in chemical composition and heat value with the Drumheller lignite and is superior to the Edmonton lignite, but it is decidedly inferior to both the Drumheller and Edmonton lignites in its greater percentage of ash, its high moisture content as mined, and in its rapid loss of moisture on air-drying. In this respect it lies between the Edmonton lignite and that of Souris river, Saskatchewan. The rapid loss of moisture on air-drying causes the coal to shrink, crack, and rapidly fall to pieces, leaving very little lump.

COMMERCIAL POSSIBILITIES.

The high moisture and ash content and the corresponding low heat value of Hat Creek lignite, together with its non-coking character, makes it wholly unsuitable in its present form for locomotive use and limits its present market to that of a domestic fuel or possibly of a fuel for use in stationary power plants. The great distance of the deposit from a market and the consequent large degradational loss in transit and storage considerably reduces the possibility the lignite has of competing successfully in the unprepared state with the higher-grade coals of the Pacific Coast. An unsuccessful attempt was made in 1924 to market the coal in Vancouver. It is also doubtful whether the coal in the briquetted form could compete successfully, considering the additional charge necessary through preparing the coal for market. The problems to be solved in marketing the coal are similar to those confronting the Saskatchewan lignite industry and should receive careful consideration before any large expenditure of funds in opening up the deposit is warranted.

Should a market for the coal be obtained, that part of the deposit in close proximity to the creek appears to be most economically mined by stripping off the overburden and excavating the coal from the surface downward by the open-cut method, as is being carried on at Sterco, Alberta, where up to 20 feet of overburden is being removed. This method will involve, in addition to the removal and the disposal of the gravel overburden, the handling of a large tonnage of shale, clay, and dirty coal along with the clean coal, and its separation by crushing, screening, and washing. As most of the coal lies below creek-level, the drainage of the pit would be an important factor in determining the depth the deposit could be economically worked. The distance from the creek the deposit can be economically mined by the open-cut method will be determined by the thickness of the drift mantle. Beyond where the overburden exceeds 20 feet in thickness or is covered by the volcanics the deposit will be best mined by the room-and-pillar method.

INSPECTION OF MINES.

REPORT BY GEORGE WILKINSON, CHIEF INSPECTOR OF MINES.

As required by section 94, "Coal-mines Regulation Act," chapter 171, and section 9, "Metalliferous Mines Regulation Act," chapter 172, I have the honour to submit my annual report as Chief Inspector of Coal and Metalliferous Mines, covering the year ended December 31st, 1925.

Appended hereto are the reports of the District Inspectors relative to the production of coal and coke and number of persons employed; reports of the District Inspectors on metalliferous mines; reports of Instructors of Mine-rescue Stations; report of Secretary to Board of Examiners for coal-mine officials; list of accidents reported under the provisions of section 71, subsection (1), "Coal-mines Regulation Act," and section 19, subsection (1), "Metalliferous Mines Regulation Act"; and prosecutions.

PERSONNEL OF STAFF OF INSPECTORS, INSTRUCTORS, AND BOARD OF EXAMINERS, AND THEIR ADDRESSES AT HEADQUARTERS.

Inspectors.

George Wilkinson	Chief Inspector, Victoria.
James Dickson	Acting-Inspector, Victoria.
Robert Strachan	Senior Inspector, Fernie.
Henry E. Miard	Acting-Inspector, Fernie.
John MacDonald	Inspector, Fernie.
H. H. Johnstone	Inspector, Nelson.
Henry Devlin	Inspector, Nanaimo.
Thomas R. Jackson	Inspector, Nanaimo.
John G. Biggs	Inspector, Merritt.
Thomas J. Shenton	Inspector, Prince Rupert.

Instructors, Mine-rescue Stations.

John D. Stewart	Nanaimo Station.
John Thomson	Cumberland Station.
J. T. Puckey	Fernie Station.
W. C. Stone	Middlesboro Station.

Board of Examiners for Coal-mine Officials.

George Wilkinson	Chairman, Victoria.
James Dickson	Secretary, Victoria.
H. E. Miard	Member, Fernie.

Messrs. Dickson and Miard and the Inspector of Mines of the district in which an examination is being held form the Board for granting certificates of competency to coal-miners.

An Inspector of Mines is empowered to grant provisional certificates to miners for a period not exceeding sixty days between regular examinations.

There has been no change in the staff of the Inspection Branch during the year 1925.

INSPECTION DISTRICTS.

The Province is divided into six Inspection Districts, as follows:—

Inspection District.	Mining Divisions covered by Inspection District.
Vancouver Island	Victoria, Alberni, Clayoquot, Quatsino, and that portion of the Nanaimo Division situated on Vancouver Island.
Southern Coast	Vancouver, New Westminster, and that portion of Nanaimo Division situated on the Mainland.

Inspection District.	Mining Divisions covered by Inspection District.
Northern	Atlin, Liard, Stikine, Portland Canal, Nass River, Omineca, Peace River, Skeena, Bella Coola, and Queen Charlotte Islands.
Nicola-Princeton	Cariboo, Quesnel, Clinton, Lillooet, Kamloops, Ashcroft, Nicola, Vernon, Similkameen, and Osoyoos.
West Kootenay and Boundary	Revelstoke, Lardeau, Trout Lake, Ainsworth, Slocan, Arrow Lake, Slocan City, Nelson, Trail Creek, Greenwood, and Grand Forks.
East Kootenay	Fort Steele, Windermere, and Golden.

The Inspectors have jurisdiction over both the coal and metalliferous mines in their respective districts.

PRODUCTION.

The total gross tonnage produced by the coal-mines of the Province for the year ended December 31st, 1925, was 2,444,292 tons, being an increase of 456,759 long tons or a little more than 20 per cent. over the production of 1924.

The Coast District, which includes Vancouver Island, Nicola-Princeton, and Telkwa coalfields, produced 1,589,812 long tons, a decrease of 124,203 tons or about 7 per cent. as compared with 1924. The Vancouver Island collieries produced during 1925 1,412,757 long tons, a decrease of 73,575 tons or nearly 5 per cent. as compared with 1924. The Telkwa mines in the Northern District produced 1,581 long tons, an increase of 353 tons or nearly 28 per cent. The Nicola-Princeton District produced 175,474 long tons, a decrease of 50,971 tons or about 22 per cent. as compared with 1924. The East Kootenay District produced 854,480 long tons, an increase of 580,962 tons or over 212 per cent. as compared with 1924. The output of coke was 75,185 long tons, as compared with 30,615 produced in 1924, an increase of over 145 per cent.

Of the total output of coal for 1925 over 76 per cent. was produced by the three larger companies—Crow's Nest Pass Coal Company, in the East Kootenay District, and the Western Fuel Corporation of Canada, Limited, and Canadian Collieries (Dunsmuir), Limited, operating on Vancouver island.

Other companies that produced during 1925 were: The Corbin Coals, Limited, in East Kootenay; the Granby Company, the East Wellington Coal Company, the Nanoose-Wellington Coal Company, and King & Foster on Vancouver island; the Middlesboro Collieries and Keystone Coal Company in the Nicola valley; the Coalmont Collieries of Coalmont; the Princeton-B.C. Colliery and Tulameen Valley Coal Company of Princeton; and the Telkwa Collieries of Telkwa. A small shipment was made by a new producer, the Sunshine Coal Company, in the Nicola valley. The official returns of these companies will be found in the reports of the Inspectors of the various districts.

A small amount of development-work was done during the year at two points in the vicinity of Kamloops, but no shipments made. W. H. Wall reopened the old slopes situated on what is locally known as the Guerin's ranch, about 2 miles distant from Kamloops. On the other side of the river, west of Tranquille Sanatorium, some prospecting was done on an outcrop by A. Galloway and associates. A diamond-drill hole was also put down by Mr. Galloway and associates at the outlet of Tranquille creek.

On Vancouver island the Morden mine at South Wellington and Suquash mine, both owned by the West Coast Collieries, were idle throughout the year. No. 7 mine, Wellington Extension Colliery, situated in Brights district, was closed down and abandoned during the year. No shipments of coal were made from this mine, the work done being purely exploratory and consisted of a slope driven down on a pitch of about 25° for a distance of 1,300 feet. The seam was so irregular it was decided to abandon the operation.

The following table shows the output and *per capita* production daily and for the year of the various mines:—

Name of Colliery and Mine.	Gross Tons of Coal mined during Year.	Days worked.	Total No. of Employees.	Tons of Coal mined per Employee daily.	Tons of Coal mined per Employee for Year.	No. of Employees Underground.	Tons of Coal mined per Underground Employee daily.	Tons of Coal mined per Underground Employee for Year.
Nanaimo—								
No. 1 mine	314,154	258	705	1.72	445	478	2.55	657
Reserve mine	161,118	258	345	1.81	467	217	2.88	742
Wakesiah mine	93,788	270	228	1.52	411	159	2.18	590
Comox, Nos. 4 and 5	240,830	298	713	1.14	338	527	1.53	457
Extension, Nos. 1, 2, 3, and 6	212,308	273	596	1.30	354	451	1.72	471
South Wellington, No. 5	51,072	275	147	1.26	347	115	1.61	444
Granby, No. 1 mine	196,079	303½	275	2.35	713	205	3.15	956
Nanoose, Lantzville	75,680	298	241	1.05	314	184	1.38	411
East Wellington, No. 1	54,358	241	133	1.69	409	96	2.35	566
King & Foster, Old Wellington	16,648	264½	79	0.80	211	77	0.82	216
Telkwa, Goat Creek	1,581	153	7	1.50	226	6	1.72	263
Middlesboro, Nos. 4, 4 E., 5 E., and 5 S.	37,686	179	130	1.62	289	94	2.23	401
Keystone, No. 4 mine	5,927	276	16	1.34	370	10	2.15	593
Sunshine	54	35	3	0.51	17	3	0.51	17
Coalmont, Nos. 3 and 4	117,877	279	301	1.40	398	180	2.34	654
Tulameen, No. 1 mine	6,581	200	22	1.49	290	13	2.53	506
Princeton, No. 1 shaft	7,079	248	36	0.79	196	24	1.19	294
Coal Creek, Nos. 2, 3, 1 E., 1 S., and 9.	464,133	274	760	2.23	611	549	3.08	845
Michel, Nos. 3 East and 8	321,535	232½	582	2.37	552	362	3.82	888
Corbin, Nos. 4, 5, and 6	68,812	195	124	2.84	555	78	4.52	882

COLLIERIES OF VANCOUVER ISLAND INSPECTION DISTRICT.

Of the gross output of 1,412,757 tons produced by the collieries on Vancouver island, 147,532 tons or nearly 10.5 per cent. was lost in preparation for market, 130,234 tons or 9.3 per cent. was consumed by the producing companies as fuel, 19,269 tons or 1.3 per cent. was added to stock, and 1,115,722 tons or 78.9 per cent. was sold in competitive markets.

Of the amount sold into competitive markets, 974,099 tons or 87.3 per cent. of the amount sold and nearly 70 per cent. of the total output mined was sold in Canada, and 141,623 tons or about 12.7 per cent. of the amount sold or about 10 per cent. of the total output was exported to the United States.

COLLIERIES OF THE NICOLA-PRINCETON INSPECTION DISTRICT.

Of the gross output of 175,474 tons produced by the collieries in the Nicola-Princeton District, 1,405 tons or 0.80 per cent. was lost in preparation for market, 13,844 tons or 7.9 per cent. was consumed by the producing companies as fuel, 81 tons or 0.04 per cent. was added to stock, and 160,144 tons or 91.26 per cent. was sold in competitive markets.

Of the amount sold into competitive markets, 159,320 tons or 99.49 per cent. of the amount sold and 90.75 per cent. of the total output mined was sold in Canada, and 824 tons or 0.51 per cent. of the amount sold or 0.47 per cent. of the total output was exported to the United States.

COLLIERIES OF THE EAST KOOTENAY INSPECTION DISTRICT.

Of the gross output of 854,480 tons produced by the collieries in the East Kootenay District, 51,002 tons or 5.97 per cent. was consumed by the producing companies as fuel, 115,770 tons or 13.52 per cent. was made into coke, 7,066 tons or 0.83 per cent. was added to stock, and 680,642 tons or 79.66 per cent. was sold in competitive markets.

Of the amount sold into competitive markets, 431,206 tons or 63.36 per cent. of the amount sold and 50.43 per cent. of the total output was sold in Canada, and 249,436 tons or 36.65 per cent. of the amount sold and 29.19 per cent. of the total output was exported to the United States.

Of the total amount of coke manufactured, 53,153 tons or 70.7 per cent. was sold in Canada and 21,936 tons or 29.2 per cent. exported to the United States; 96 tons was added to stock.



Lantzville Colliery.



Cassidy Colliery—First-aid Building.

OUTPUT AND PER CAPITA PRODUCTION OF VARIOUS DISTRICTS.

The following table shows, for the past eleven years, the output and the *per capita* production of the various districts:—

Year.	District.	Gross Tons of Coal mined during Year.	Total No. of Employees at Producing Collieries.	Tons of Coal mined per Employee for Year.	Number of Men employed Underground in Producing Collieries.	Tons of Coal mined per Underground Employee for Year.
1915	East Kootenay District	852,572	1,748	488	1,183	721
	Coast District	1,120,008	3,230	347	2,512	446
	Whole Province	1,972,580	4,978	396	3,695	534
1916	East Kootenay District	882,270	1,674	527	1,125	784
	Coast District	1,603,310	3,386	474	2,569	624
	Whole Province	2,485,580	5,060	491	3,694	673
1917	East Kootenay District	551,751	1,481	372	944	584
	Coast District	1,846,964	3,689	501	2,816	656
	Whole Province	2,398,715	5,170	463	3,760	638
1918	East Kootenay District	732,864	1,327	552	814	900
	Coast District	1,845,860	4,100	450	2,844	645
	Whole Province	2,578,724	5,427	475	3,658	705
1919	East Kootenay District	558,806	1,369	409	1,000	559
	Coast District	1,850,142	4,597	402	3,145	588
	Whole Province	2,408,948	5,966	404	4,145	581
1920	East Kootenay District	847,389	1,582	536	1,062	798
	Coast District	1,849,385	4,767	388	3,129	591
	Whole Province	2,696,774	6,349	425	4,191	643
1921	East Kootenay District	759,755	1,774	428	1,207	629
	Coast District	1,809,884	5,111	354	3,515	515
	Whole Province	2,569,639	6,885	373	4,722	544
1922	East Kootenay District	554,361	1,538	360	1,063	521
	Coast District	2,026,554	5,106	396	3,649	551
	Whole Province	2,580,915	6,644	388	4,712	547
1923	East Kootenay District	740,531	1,434	516	965	767
	Coast District	1,802 456	4,715	395	3,377	546
	Whole Province	2,542,987	6,149	413	4,342	585
1924	East Kootenay District	273,518	1,147	238	797	343
	Coast District	1,714,015	4.271	401	3,097	553
	Whole Province	1,987,533	5,418	366	3,894	510
1925	East Kootenay District	854,480	1,466	582	989	864
	Coast District	1,589.812	3,977	399	2,839	559
	Whole Province	2,444,292	5,443	449	3,828	639

The following table shows the production and distribution of coal and coke by the various collieries and districts, compiled from returns furnished by the owners as required by section 66, "Coal-mines Regulation Act":—

COLLIERIES OF BRITISH COLUMBIA—PRODUCTION, 1925.

Mine.	Sold.			Total Sales.	Lost in Washing.	Used in making Coke.	Used under Co.'s Boilers, etc.	Total for Colliery Use.	Stocks.		Difference.		Output for Year 1925.
	In Canada.	In U.S.A.	Elsewhere.						First of Year.	Last of Year.	Added to.	Taken from.	
Vancouver Island.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons (2240 lb.).
Canadian Collieries (D.), Ltd.—S. Wellington.	36,349	.....	.....	36,349	10,017	.....	4,706	14,723	.....	.....	.....	.....	51,072
Extension	97,762	63,304	....	161,066	34,885	.....	17,297	51,682	4,567	4,127	.....	440	212,308
Comox	202,976	1,011	.....	203,987	31,294	.....	6,390	37,684	9,663	8,822	.....	841	240,830
Western Fuel Corp. of Can.—No. 1, Nanaimo	213,807	33,495	.....	247,302	13,709	.....	41,603	55,312	8,602	20,142	11,540	.....	314,154
Reserve	116,564	18,261	.....	134,825	9,726	.....	10,502	20,228	1,847	7,912	6,065	.....	161,118
Wakesiah	61,014	9,559	.....	70,573	3,211	.....	16,920	20,131	794	3,878	3,084	.....	93,788
Nanoose-Wellington Collieries, Ltd.	53,231	2,598	.....	55,829	11,064	.....	8,899	19,963	1,022	910	.....	112	75,680
King & Foster Coal Co., (Island Coll.)	16,430	.....	.....	16,430	.....	.....	218	218	.....	.....	.....	.....	16,648
East Wellington Coal Co.—East Wellington	42,483	.....	.....	42,483	4,170	.....	7,431	11,601	85	359	274	.....	54,358
Granby Cons. M. S. & P. Co., Ltd.—Cassidy	133,483	13,395	.....	146,878	29,956	.....	16,268	46,224	1,465	1,164	.....	301	192,801
Totals, Vancouver Island	974,099	141,623	.....	1,115,722	147,532	.....	130,234	277,766	28,045	47,314	20,963	1,694	1,412,757
Nicola-Princeton District.													
Middlesboro Collieries, Ltd.	33,626	.....	.....	33,626	.....	.....	4,083	4,083	380	357	.....	23	37,686
Princeton-B.C. Colliery Co., Ltd	4,330	112	.....	4,442	.....	.....	2,608	2,608	63	92	29	.....	7,079
Coalmont Collieries, Ltd.	110,229	712	.....	110,941	....	.....	6,936	6,936	.....	.....	.....	.....	117,877
Tulameen Valley Coal Co., Ltd.	5,416	....	.....	5,416	1,405	.....	.....	1,405	25	55	30	.....	6,851
Keystone Coal Co., Ltd	5,665	.....	.....	5,665	.....	.....	217	217	35	80	45	.....	5,927
Sunshine Coal Co., Ltd.	54	.....	.....	54	.....	.....	.....	.....	.....	.....	.....	.....	54
Totals, Nicola-Princeton District	159,320	824	.....	160,144	1,405	.....	13,844	15,249	503	584	104	23	175,474
Northern District.													
Telkwa Collieries, Ltd.	1,581	.....	.....	1,581	.....	.....	.....	.....	.....	.....	.....	.....	1,581
Grand totals, Coast District	1,135,000	142,447	.....	1,277,447	148,937	.....	144,078	293,015	28,548	47,898	21,067	1,717	1,589,812
East Kootenay District.													
Crow's Nest Pass Coal Co.—Coal Creek Coll'ry	159,641	223,209	.....	382,850	.....	46,053	30,136	76,189	397	5,491	5,094	.....	464,133
Michel Colliery	234,894	1,233	.....	236,127	.....	69,717	15,401	85,118	.....	290	290	....	321,535
Corbin Coals, Ltd.	36,671	24,994	.....	61,665	.....	.....	5,465	5,465	1,428	3,110	1,682	.....	68,812
Totals, East Kootenay District	431,206	249,436	.....	680,642	.....	115,770	51,002	166,772	1,825	8,891	7,066	.....	854,480
Coal.													
Total coal for Province	1,566,206	391,883	.....	1,958,089	148,937	115,770	195,080	459,787	30,373	56,789	28,133	1,717	2,444,292
*Coke.**													
Crow's Nest Pass Coal Co.—Coal Creek	28,761	.....	.....	28,761	.....	.....	.....	.....	.....	89	89	.....	28,850
Michel	24,392	21,936	.....	46,328	.....	.....	.....	.....	410	417	7	.....	46,335
Total coke for Province	53,153	21,936	.....	75,089	.....	.....	.....	.....	410	506	96	.....	75,185

* NOTE BY PROVINCIAL MINERALOGIST.—By-product oven coke, amounting to 57,446 tons, produced at Anyox, is made from a mixture of British Columbia and Alberta coal and is therefore not listed as mineral production for British Columbia. The British Columbia coal used in making this coke is credited in the coal production.

COLLIERIES OF BRITISH COLUMBIA—MEN EMPLOYED, 1925.

Mine.	White Men.																Indians.			Japanese and Chinese.									Total Men employed.		
	Supervision and Clerical.			Miners.			Helpers.			Labourers.			Mechanics and Skilled Labour.			Boys.			Labourers.			Miners.			Helpers.			Labourers.					
	U.	A.	T.	U.	A	T.	U.	A.	T.	U.	A.	T.	U.	A.	T.	U.	A.	T.	U.	A.	T.	U.	A.	T.	U.	A.	T.	U.	A.	T.	U.	A.	T.
Vancouver Island.																															
Canadian Coll. (D.), Ltd.—S. Wellington	2	1	3	79	..	79	..	..	..	26	23	49	8	8	16	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	115	32	147
Extension	26	15	41	283	..	283	12	..	12	102	25	127	22	35	57	..	21	21	..	..	..	..	..	..	..	..	..	6	49	55	451	145	596
Comox	42	20	62	102	..	102	..	..	..	31	44	75	70	76	146	..	7	7	..	..	..	115	..	115	97	..	97	70	39	109	527	186	713
Western Fuel Corp. of Canada—																															
No. 1, Nanaimo	24	25	49	193	..	193	..	..	..	146	65	211	76	51	127	38	20	58	1	1	2	..	..	..	..	..	..	..	65	65	478	227	705
Reserve	12	11	23	111	..	111	4	..	4	57	32	89	17	28	45	15	18	33	1	..	1	..	..	..	..	..	..	..	39	39	217	128	345
Wakesiah	7	6	13	59	..	59	..	..	..	56	21	77	22	18	40	15	8	23	..	..	..	..	..	..	..	..	..	..	16	16	159	69	228
Nanoose-Wellington Collieries, Ltd.—																															
Lantzville	11	6	17	94	..	94	17	..	17	41	8	49	7	17	24	14	8	22	..	..	..	..	..	..	..	..	..	..	18	18	184	57	241
East Wellington Coal Co., Ltd	2	2	5	50	..	50	..	..	..	27	4	31	11	8	19	6	9	15	..	..	..	..	..	..	..	..	..	..	13	13	96	37	133
King & Foster Coal Co. (Island Coll.)	4	2	6	35	..	35	11	..	11	14	..	14	13	..	13	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	77	2	79
Granby C. M. S. & P. Co., Ltd.—Cassidy	9	8	17	135	..	135	..	..	..	61	42	103	..	20	20	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	205	70	275
Totals, Vancouver Island	139	97	236	1141	..	1141	44	..	44	561	264	825	246	261	507	88	91	179	2	1	3	115	..	115	97	..	97	76	239	315	2509	953	3,462
Nicola-Princeton District.																															
Middlesboro Collieries, Ltd	9	3	12	46	..	46	12	..	12	27	19	46	..	10	10	..	4	4	..	..	..	..	..	..	..	..	..	..	..	..	94	36	130
Princeton-B.C. Colliery, Ltd	3	1	4	7	..	7	8	..	8	4	6	10	2	5	7	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	24	12	36
Coalmont Collieries, Ltd	10	14	24	114	..	114	..	..	..	51	79	130	1	24	25	4	3	7	..	..	..	..	..	..	..	..	..	..	1	1	180	121	301
Tulameen Valley Coal Co., Ltd.	1	1	2	10	..	10	..	..	..	2	7	9	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	13	9	22
Keystone Coal Co., Ltd.	2	1	3	5	..	5	3	..	3	..	3	3	..	2	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	10	6	16
Sunshine Coal Co., Ltd.	..	..	..	3	..	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	..	3
Totals, Nicola-Princeton District	25	20	45	185	..	185	23	..	23	84	114	198	3	42	45	4	7	11	..	..	..	..	..	..	..	..	..	..	1	1	324	184	508
Northern District.																															
Telkwa Collieries, Ltd	1	..	1	2	..	2	2	..	2	1	..	1	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	6	1	7
Grand totals, Coast District	165	117	282	1328	..	1328	69	..	69	646	378	1024	249	304	553	92	98	190	2	1	3	115	..	115	97	..	97	76	240	316	2339	1138	3,977
East Kootenay District.																															
Crow's Nest Coal Co.—Coal Creek Coll.	21	13	34	285	..	285	..	..	..	51	76	127	180	118	298	12	4	16	..	..	..	..	..	..	..	..	..	..	..	..	549	211	760
Michel Colliery	15	9	24	185	..	185	..	..	..	33	126	159	113	68	181	16	13	29	..	..	..	..	..	..	..	..	..	..	4	4	362	220	582
Corbin Coals, Ltd.	5	10	15	52	..	52	15	..	15	..	10	10	6	24	30	..	8	2	..	..	..	..	..	..	..	..	..	..	..	..	78	46	124
Totals, East Kootenay District	41	32	73	522	..	522	15	..	15	84	212	296	299	210	509	28	19	47	..	..	..	..	..	..	..	..	..	..	4	4	989	477	1,466
Grand totals for Province	206	149	355	1850	..	1850	84	..	84	730	590	1320	548	514	1062	120	117	237	2	1	3	115	..	115	97	.	97	76	244	320	3328	1615	5,443

NOTE.—U = underground; A = above ground; T = total.

LABOUR AND EMPLOYMENT.

During 1925 there were 5,443 persons employed in and about the coal-mines of the Province, an increase of twenty-five over the previous year.

The collieries of the Province were practically free from labour troubles during the year. A stoppage for a few days occurred in Nanaimo while a new wage agreement was being considered, otherwise there was no time lost from this cause in any other part of the Province. Apart from regular holidays, the mines in Vancouver Island District lost about 20 per cent. in the working-days through lack of trade.

In the Nicola-Princeton District the different collieries worked from 60 to 90 per cent. of the working-days, averaging for the district about 77 per cent. of the working-days.

The mines in the East Kootenay District worked from 65 per cent. at the lowest to 90 per cent. at the highest of the working-days during the year and worked on an average for the whole district about 75 per cent. of the time.

The table on page 339 shows the number of persons ordinarily employed in and about the mines, distinguishing the persons and different classes employed underground and above ground, compiled from returns furnished by the owners as required by section 66, "Coal-mines Regulation Act."

FUEL-OIL COMPETITION.

Fuel-oil continues to be a keen competitor with coal produced from the Vancouver Island mines and the production of the California wells is being well maintained, but is considerably less than the peak year of 1923.

The following table shows the production, consumption, and price at the wells for the year 1913 to 1924, inclusive, and the first eleven months of 1925:—

CALIFORNIA OIL STATISTICS.

Year.	Production.		Consumption.		Price at Wells.
	Total Barrels.	Monthly Average of Barrels.	Total Consumption of Barrels.	Monthly Average of Barrels.	
1913	98,867,183	8,155,598	97,083,728	8,083,728	35c.
1914	102,871,907	8,572,658	94,470,987	7,827,582	45c.
1915	89,725,766	7,477,148	92,007,715	7,667,309	33c. to 40c.
1916	91,926,019	7,660,501	101,312,905	8,442,742	40c. to 73c.
1917	97,781,574	8,148,464	108,764,872	9,063,739	73c. to 98c.
1918	102,643,415	8,553,618	106,155,043	8,846,253	98c. to $1.23
1919	101,907,729	8,492,311	103,248,706	8,604,059	$1.23
1920	105,618,706	8,801,559	113,804,251	9,483,687	$1.23 to $1.60
1921	114,566,901	9,547,249	102,629,470	8,552,456	$1.60 to $1.10
1922	139,626,876	11,635,573	119,370,518	9,947,543	$1.10 to 60c.
1923	263,660,000	21,971,666	237,062,500	19,755,208	60c.
1924	230,063,117	19,171,926	214,784,128	17,898,677	$1.00 to $1.25
1925 (eleven months)	210,897,631	19,172,512	182,877,369	16,625,215	$1.25 to 85c.

From the above figures it is seen the monthly production is well on to 3,000,000 barrels per month less during 1925 than in 1923, but the consumption has fallen off over 3,000,000 barrels per month.

The price per barrel advanced at the well from 60 cents in 1923 to $1.25 in December, 1924, at which price it continued until July, 1925, when the price was dropped to $1 in August. In September a further reduction was made to 80 cents per barrel.

The total quantity in stock on November 30th, 1925, was 152,360,730 barrels, as against 123,945,219 barrels on November 30th, 1924, an increase in stocks of 28,415,511 barrels.

In addition to the competition from the use of fuel-oil, the Vancouver Island mines are being affected to some extent by the entry of some 50,000 tons of coal in the British Columbia markets in the Coast cities from Alberta, Great Britain, and the State of Washington, U.S.A. Some 35,000 tons of the latter entered as lignite and escaped duty charges.

ACCIDENTS IN AND AROUND COAL-MINES.

During 1925 there were 5,443 persons employed in and around coal-mines. Six fatal accidents occurred during the year, as compared with nine for 1924.

The ratio of fatal accidents per 1,000 persons employed was 1.10, compared with 1.66 in 1924; in 1923 the ratio was 7.32; in 1922, 4.66; in 1921, 1.45; in 1920, 2.67; in 1919, 2.10; in 1918, 5.15; in 1917, 8.51; in 1916, 5.33; averaging for the ten-year period 4. The number of fatal accidents per 1,000,000 tons produced during 1925 was 2.45. During 1924 the fatalities per 1,000,000 tons of coal mined was 4.52; in 1923 the number was 17.6; in 1922, 12.01; in 1921, 3.98; in 1920, 6.30; in 1919, 4.98; in 1918, 10.86; in 1917, 18.34; in 1916, 11.27; the average for the ten-year period being 9.3 per 1,000,000 tons mined.

The following table shows the collieries at which fatal accidents occurred during 1925 and comparative figures for 1924:—

Name of Company.	Name of Colliery.	1925.	1924.
Canadian Collieries (D.), Ltd.	Comox, No. 5 mine	..	2
" "	Extension, No. 2 mine	1	..
" "	South Wellington, No. 5 mine	1	..
Western Fuel Corporation of Canada, Ltd.	Wakesiah mine	2	1
" " "	Reserve mine	1	..
Granby Cons. Mining, Smelting & Power Co., Ltd.	Granby, No. 1 mine	1	1
East Wellington Coal Co., Ltd.	East Wellington	..	2
Nanoose-Wellington Coal Co., Ltd.	Lantzville mine	..	1
Crow's Nest Pass Coal Co., Ltd.	Coal Creek Colliery	..	1
" "	Michel Colliery	..	1
Totals		6	9

The following table shows the various causes of fatal accidents and their percentage of the whole, with corresponding figures for the previous year:—

Cause.	1925.		1924.	
	No.	Per Cent.	No.	Per Cent.
Falls of rock	4	66.67	4	44.45
Falls of coal	..	.....	1	11.11
Mine-cars and haulage	1	16.67	2	22.22
Miscellaneous (underground)	1	16.66	1	11.11
Miscellaneous (surface)	..	.....	1	11.11
Totals	6	100.00	9	100.00

The following table shows the number of tons of coal mined for each fatal accident in their respective classes in the years 1925 and 1924:—

Cause.	1925.		1924.	
	No. of Fatal Accidents.	No. of Tons of Coal mined per Fatal Accident.	No. of Fatal Accidents.	No. of Tons of Coal mined per Fatal Accident.
Falls of rock	4	611,073	4	496,888
Falls of coal	..	....	1	1,987,533
Mine-cars and haulage	1	2,444,292	2	993,766
Miscellaneous (underground)	1	2,444,292	1	1,987,533
Miscellaneous (surface)	..	....	1	1,987,533
Totals	6	407,382	9	220,837

The number of tons of coal mined per fatal accident during 1925 was 407,382 tons, compared with 220,837 tons for 1924; the average for the last ten years was 107,366 tons.

The following table shows the fatalities from various causes in coal-mines during the year 1925 and comparisons with 1924, classified according to Inspection Districts:—

District.	Number of Deaths from Accidents.						Total.		Accident Death-rate.			
	Explosions of Fire-damp.	Falls of Ground.	Shaft Accidents.	Haulage and Mine-cars.	Miscellaneous (Underground).	On Surface.	1925.	1924.	Per 1,000 Persons employed.		Per 1,000,000 Tons of Coal mined.	
									1925.	1924.	1925.	1924.
Vancouver Island...	..	4	..	1	1	..	6	7	1.73	1.87	4.24	4.70
Nicola-Princeton ...	..	..	..	..	..	..	None	None	None	None	None	None
East Kootenay.....	..	..	..	..	..	..	None	2	None	1.74	None	7.31
Northern.....	..	..	..	..	..	..	None	None	None	None	None	None
Province (1925).	..	4	..	1	1	..	6	..	1.10	....	2.45	....
Province (1924).	..	5	..	2	1	1	..	9	....	1.66	....	4.52

The following table shows the ratio of accidents per 1,000 employees and per 1,000,000 tons of coal mined in the Coast and East Kootenay Inspection Districts for the ten-year period ended December 31st, 1925:—

District.	No. of Fatalities.	Accident Death-rate.	
		Per 1,000 Employees.	Per 1,000,000 Tons of Coal mined.
Coast.....	165	3.7	9.0
East Kootenay.....	66	4.4	9.6
For Province.....	231	4.0	9.3

Details surrounding the occurrences of the fatal accidents in coal-mines during 1925 are as follows:—

The fatal accident which occurred to Walter P. Clark, a miner, on May 6th in the Wakesiah mine, Nanaimo Colliery, operated by the Western Fuel Corporation of Canada, was caused by a fall of rock. A heavy piece of coal broke away from a slip at the face and in falling it knocked out two posts. A heavy piece of cap-rock started moving and swung two other posts out, allowing the rock and timbers to fall on the deceased.

The fatal accident which occurred to Peter Whiskers, a miner, on May 15th in No. 2 mine, Wellington Extension Colliery, operated by the Canadian Collieries (Dunsmuir), Limited, was caused by a fall of rock. A shot had just been fired, and the fireboss states he had examined the place and the miners had returned to the face, when a piece of rock about 6 by 3 feet and 18 inches thick fell on the deceased, striking him on the back, causing internal injuries which proved fatal. The fireboss was in the place when the accident occurred. It would appear a careful inspection of the place had not been made and the miners had been allowed to return to the face too soon. If more time had been taken, in all probability the accident would have been avoided.

The fatal accident which occurred to George Scales, a tracklayer, on July 26th in the Reserve mine, Nanaimo Colliery, operated by the Western Fuel Corporation of Canada, Limited, was caused by being struck on the side of the head with a rail. The deceased was waiting at the siding for a pair of rails which he had loaded on top of a car of coal; when the car was lowered to the siding one of the rails apparently struck him, causing injuries from which he died eight hours later. This was an avoidable accident. There was sufficient space for the deceased to have stood clear without any danger of being struck.

The fatal accident which occurred to Joseph Lavin, a shiftboss, on July 14th in the Granby No. 1 mine, Cassidy, operated by the Granby Consolidated Mining, Smelting, and Power Company, Limited, was caused by being run over with a trip of cars on the haulage-slope. The deceased was riding up the slope on a trip of cars, when he jumped from the trip while in motion and in some manner his legs got under the wheels of the cars, and he received injuries as follows: Fracture of right knee and ankle; compound fracture of left leg, causing amputation; scalp-wounds; fractured ribs left side, back and front. He died two days later from shock of operation. This accident was avoidable; deceased should not have attempted to get off the trip while in motion.

The fatal accident which occurred to William Logan, a miner, on September 10th was caused by a fall of rock. While digging a piece of coal from the face a piece of rock about 4 by 3 feet and 17 inches thick slipped from the roof, crushing his head to the floor, killing him instantaneously. The place where the accident occurred was a long-wall face, where the seam was only 22½ inches high. The place was not timbered as required by the special systematic timbering rules in force at the colliery; if it had, in all probability the accident would have been avoided.

The fatal accident which occurred to Peter Cameron, a miner in the No. 5 mine, South Wellington Colliery, operated by the Canadian Collieries (Dunsmuir), Limited, was caused by a fall of rock. The deceased was driving the rib-bar of the drilling-machine into the coal for the purpose of drilling a hole to straighten the rib, when the cap-rock came away and fell on him, causing injuries from which he succumbed three days later. The accident would have been avoided if proper sprags had been put in.

Five out of the six or over 80 per cent. of the fatal accidents were avoidable and caused by want of care.

In addition to the six fatal accidents, there was reported, under the requirements of section 71, "Coal-mines Regulation Act," thirty-six non-fatal accidents. Thirteen of them were caused by fall of rock, fourteen by haulage, five by falling timber, and four from miscellaneous causes. Sixteen of the persons injured were miners, seven drivers, two timbermen, two rope-riders, two labourers, and one each for the following class of labour: Brusher, blacksmith, machine-runner, tracklayer, motorman, fireboss, and pusher.

Of the above thirty-six non-fatal accidents, twenty were caused through want of care on the part of the injured person, five through want of care on the part of other persons, and eleven were pure accidents.

From the above it is seen that nearly 70 per cent. of the accidents were avoidable.

EXPLOSIVES.

The following table shows the quantity of explosives used in coal-mines during 1925, together with number of shots fired, how shots were fired, tons of coal produced per pound explosive used, and the average pounds of explosive per shot fired (these quantities include all explosives used for breaking coal and for rock-work in coal-mines):—

VANCOUVER ISLAND DISTRICT.

Colliery and Mine.	Quantity of Explosive used in Pounds.	Tonnage for Mine.	Total No. of Shots fired.	Tons of Coal per Pound of Explosive used.	Average Pounds of Explosive per Shot fired.
Nanaimo, No. 1	64,079	314,154	87,694	4.90	0.730
" Reserve	49,872	161,118	70,615	3.23	0.710
" Wakesiah	22,366	93,788	35,055	4.19	0.638
Comox, Nos. 4 and 5	25,789	240,830	33,080	9.33	0.779
Extension, Nos. 1, 2, 3, and 6	78,166	212,308	112,649	2.71	0.693
South Wellington, No. 5	15,174	51,072	22,500	3.36	0.674
Granby, No. 1	25,152	192,801	24,946	7.66	1.008
Nanoose, Lantzville	33,800	75,680	56,500	2.24	0.598
East Wellington, No. 1	24,915	54,358	27,200	2 18	0.912
King & Foster, Old Wellington	16,600	16,648	13,500	1.00	1.230
Total for district	355,913	1,412,757	483,739	3.97	0.737

NORTHERN DISTRICT.

Colliery and Mine.	Quantity of Explosive used in Pounds.	Tonnage for Mine.	Total No. of Shots fired.	Tons of Coal per Pound of Explosive used.	Average Pounds of Explosive per Shot fired.
Telkwa, Goat Creek	425	1,581	450	3.72	0.944
NICOLA-PRINCETON DISTRICT.					
Middlesboro, Nos. 4, 4 E., 5 E., and 5 S.	11,000	37,686	16,050	3.42	0.685
Keystone, No. 4	2,840	5,927	3,325	2.08	0.854
Sunshine, No. 1	None	55	None	....	....
Coalmont, Nos. 4 and 3	37,324	117,876	56,527	3.15	0.663
Princeton, No. 1 shaft	1,169	7,079	1,405	6.05	0.832
Tulameen, No. 1	2,200	6,851	3,493	3.11	0.630
Total for district	54,533	175,474	80,800	3.21	0.675
EAST KOOTENAY DISTRICT.					
Coal Creek, Nos. 2, 3, 1 E., 1 S., and 9	4,370	464,133	3,430	106.20	1.274
Michel, Nos. 3 E., and 8	20,508	321,523	30,920	15.68	0.663
Cobin, Nos. 4, 5, and 6	12,228	68,812	10,253	5.62	1.193
Total for district	37,106	854,468	44,603	23.03	0.832
Total for Province	447,977	2,444,280	609,592	5.45	0.734

QUANTITIES OF DIFFERENT EXPLOSIVES USED.

	Lb.		Lb.
Monobels of different grades	384,685	Coalite	3,760
CXL-ite	28,264	Gelpermite	1,345
Miner's Friend of different grades	24,960		
Permitite	4,963	Total	447,977

The following is a list of explosives permitted for use in coal-mines by the Honourable the Minister of Mines under the provisions of section 101, General Rule 11, clause (2), "Coal-mines Regulation Act":—

Nobel Monobel.
Polar Monobel No. 3.
Polar Monobel No. 4.
Polar Monobel No. 6.
Coalite "C" L.F.
Miner's Friend No. 6.
Miner's Friend No. 9.
Polar CXL-ite.
Gelpermite No. 1.

MACHINE-MINED COAL.

During 1925 mining-machines produced 138,400 tons of coal, or 5.6 per cent. of the total. Of the total machine-mined coal, Vancouver Island District produced 131,481 tons, or 94.64 per cent.; Nicola-Princeton District produced 7,079 tons, or 5.11 per cent.; and East Kootenay District 340 tons, or 0.25 per cent.

The following tables give the district, number of machines, how driven, tons of coal produced, and type of machine used:—

District.	No. driven by		Tons of Coal produced.		Total Tons (2,240 lb.).
	Electricity.	Compressed Air.	Electricity.	Compressed Air.	
Vancouver Island	5	23	7,988	122,993	130,981
Nicola-Princeton	..	2	.....	7,079	7,079
East Kootenay	..	1	.....	340	340
Northern	..	..	....	.....	.....
Totals	5	26	7,988	130,412	138,400

TYPE OF MACHINES IN USE.

Type.	Districts.				Total.
	East Kootenay.	Nicola-Princeton.	Vancouver Island.	Northern.	
M.C. Pick-quick cutter-bar	..	..	6	..	6
Siskol punchers	..	..	10	..	10
Sullivan chain-cutters	..	..	9	..	9
Radialaxe punchers	..	2	2	..	4
Ingersoll-Rand punchers	..	..	1	..	1
Hardy Post-type punchers	1	..	..	..	1
Totals	1	2	28	..	31

The machine-mined coal produced by the different companies during 1925 and comparative figures for 1924 are as follows:—

	1925. Tons.	1924. Tons.
Canadian Western Fuel Corporation of Canada, Nanaimo	86,683	87,721
Canadian Collieries (D.), Ltd., Comox	3,988	11,754
Nanoose-Wellington Collieries, Ltd.	9,348	13,392
East Wellington Coal Co., Ltd.	30,962	15,388
Princeton-B.C. Colliery	7,079	9,862
Coalmont Collieries, Ltd.	.....	3,600
Crow's Nest Pass Coal Co., Ltd., Michel	340	1,004
Corbin Coals, Ltd.	.....	200
Totals	138,400	142,921

SAFETY-LAMPS.

There were 4,856 safety-lamps in use in the coal-mines of the Province. Of this number, 400 were flame-lamps of the Wolf type and 4,456 were electric lamps of various makes, as follows: Edison, 3,831; Wheat, 625. No open lights are allowed in the coal-mines of British Columbia.

The following table shows the distribution of lamps by district, method of locking, and the illuminant used:—

VANCOUVER ISLAND DISTRICT.

Colliery and Mine.	Method of Locking Lamp.		Illuminant Used.	
	Magnetic Lock.	Screw or Automatic Clip.	Naphtha.	Electricity.
Nanaimo, No. 1	81	524	81	524
" Reserve	13	288	13	288
" Wakesiah	14	184	14	184
Comox, Nos. 4 and 5	27	591	27	591
Extension, Nos. 1, 2, 3, and 6	29	546	37	538
South Wellington, No. 5	8	130	8	130
Granby, No. 1	13	208	13	208
Nanoose, Lantzville	20	275	20	275
East Wellington, No. 1	10	166	10	166
King & Foster, Old Wellington	4	50	4	50
Totals for district	219	2,962	227	2,954

NORTHERN DISTRICT.

Telkwa, Goat Creek	8	..	8	..

NICOLA-PRINCETON DISTRICT.

Colliery and Mine.	Method of Locking Lamp.		Illuminant Used.	
	Magnetic Lock.	Screw or Automatic Clip.	Naphtha.	Electricity.
Middlesboro, Nos. 4, 4 E., 5 E., and 5 S	15	70	15	70
Keystone, No. 4	4	20	4	20
Coalmont, Nos. 3 and 4	10	250	10	250
Sunshine, No. 1	3	..	3	..
Tulameen, No. 1	1	13	1	13
Princeton, No. 1 shaft	4	31	4	31
Totals for district	37	384	37	384

EAST KOOTENAY DISTRICT.

Coal Creek, Nos. 2, 3, 1 E., 1 S., and 9	70	600	70	600
Michel, Nos. 3 E. and 8	23	438	23	438
Corbin, Nos. 4, 5, and 6	35	80	35	80
Totals for district	128	1,118	128	1,118
Totals for Province	392	4,464	400	4,856

The following is a list of safety-lamps permitted for use in the coal-mines of British Columbia:—

APPROVED (ELECTRIC) SAFETY-LAMPS.

No. 1.—The electric lamp manufactured by the Edison Storage Battery Co., Orange, N.J., U.S.A., under approval No. 10 of the United States Bureau of Mines. This lamp shall be used with a flexible cord identified by the Bureau's specification CD–17. The only bulbs approved for use with this lamp are the symbol BM–10 bulbs, manufactured by the National Lamp Works of the General Electric Co., Cleveland, Ohio; the symbol BM–10 bulbs, manufactured by the Edison Works of the General Electric Co., Harrison, N.J.; the symbol 26–V bulbs, manufactured by the Miniature Incandescent Lamp Corporation, 95 Eighth Avenue, Newark, N.J.; and the symbol BM–10 bulbs, manufactured by the Westinghouse Lamp Co., Bloomfield, N.J.

No. 2.—The Concordia approved portable electric (hand-lamp) mine-lamp, manufactured by the Concordia Electric Co., Pittsburgh, Pa., under approval No. 12 of the United States Bureau of Mines. The only bulbs approved for use with this lamp are the symbol Osram 08510 bulbs, sold by the Concordia Electric Co.

No. 3.—The Wico approved portable electric mine-lamp, manufactured by the Witherbee Igniter Co., Springfield, Mass., under approval No. 14 of the United States Bureau of Mines. This lamp shall be used with a flexible cord identified by the Bureau's specification CD–43. The only bulbs approved for use with the lamp are the symbol BM–14 bulb, manufactured by the Edison Lamp Works of the General Electric Co., Harrison, N.J.

No. 4.—The Concordia approved permissible portable electric mine-lamp, manufactured by the Concordia Electric Co., Pittsburgh, Pa., under approval No. 12 of the United States Bureau of Mines. This lamp shall be used with a flexible cord identified by the Bureau's specification CD–17. The only bulbs approved for use with this lamp are the BM–15 bulbs, manufactured by the National Lamp Works of the General Electric Co., Cleveland, Ohio.

No. 5.—The Pioneer approved portable electric mine-lamp, manufactured by the Pioneer Electric Mine Lamp Co., Philadelphia, Pa., under approval No. 16 of the United States Bureau of Mines. This lamp shall be used with a flexible cord identified by the Bureau's specification No. CD–31, and with battery-plates manufactured by the Electric Storage Battery Co., Philadelphia, Pa. The only bulbs approved for use with this lamp are the BM–16 bulbs, manufactured by the Edison Lamp Works of the General Electric Co., Harrison, N.J.

No. 6.—The Wheat approved portable electric mine-lamp, manufactured by the Koehler Manufacturing Co. (Inc.), Marlboro, Mass., under approval No. 17 of the United States Bureau

of Mines. This lamp shall be used with a flexible cord identified by the Bureau's specification CD–31, and with battery-plates manufactured by the General Lead Battery Co., Newark, N.J. The only bulbs approved for use with this lamp are the BM–17 bulbs, manufactured by the National Lamp Works of the General Electric Co., Cleveland, Ohio.

(Unless otherwise specified, all lamps are cap-lamps.)

APPROVED (FLAME) SAFETY-LAMPS.

No. 12.—The bonneted, double-gauze lamp, with magnetic lock, known as the Wolf lamp.

No. 13.—The flat-wick steel-frame lamp, as specified in approval No. 201 of the United States Bureau of Mines, manufactured by the Koehler Manufacturing Co., Marlboro, Mass., U.S.A.

No. 14.—The round-wick steel-frame lamp, as specified in approval No. 201–A of the United States Bureau of Mines, manufactured by the Koehler Manufacturing Co., Marlboro, Mass., U.S.A.

No. 15.—The flat-wick steel-frame lamp, as specified in approval No. 202 of the United States Bureau of Mines, manufactured by Ackroyd & Best (Ltd.), Arrott Power Building, Pittsburgh, Pa., U.S.A.

No. 16.—The flat-wick aluminium-frame lamp, as specified in approval No. 203 of the United States Bureau of Mines, manufactured by the Koehler Manufacturing Co., Marlboro, Mass., U.S.A.

No. 17.—The round-wick aluminium-frame lamp, as specified in approval No. 203–A of the United States Bureau of Mines, manufactured by the Koehler Manufacturing Co., Marlboro, Mass., U.S.A.

Approvals Nos. 201, 201–A, 203, and 203–A apply to magnetic-lock lamps that are equipped with steel gauzes. The only glasses approved for use with these lamps are marked "Macbeth No. 2100 High Speed." The only igniter approved for use with these lamps is the Koehler pyro internal igniter, 1915 model, using a cerium-zinc-copper alloy for igniter-points.

Approval No. 202 applies to a magnetic-lock lamp. The only glasses approved for use with this lamp is marked as follows:—

ACKD
BEST
A–1

This lamp is relighted electrically. The only relighter approved for this lamp is the Ackroyd & Best underground relighter.

NOTE.—*While the use of flame safety-lamps is permitted, it is the policy of the Department of Mines to encourage the use of approved electric safety-lamps for all persons underground in the coal-mines, except such flame-lamps as may be required by the officials of the mines in the carrying-out of their duty.*

ELECTRICITY.

Electric power is used for various purposes on the surface at fifteen mines and underground at eight mines. The purposes for which it was used, together with the amount of horse-power in each instance, is shown in the following table:—

	Nature of its Use.	Aggregate H.P.
Above ground—		
	Winding or hoisting	900
	Ventilation	2,045
	Haulage	456
	Pumping	20
	Coal washing or screening	1,975
	Miscellaneous	991
	Total horse-power	6,387
Underground—		
	Haulage	2,119
	Pumping	1,135
	Coal-cutters	150
	Miscellaneous	40
	Total horse-power	3,444
	Total horse-power above and under ground	9,831

Of the above amount, approximately 2,600 horse-power was operated as direct current and 7,231 horse-power as alternating current.

During the year a complete set of regulations governing the use of electrical power in coal-mines was put into force pursuant to the provisions of the "Coal-mines Regulation Act."

One of the most outstanding rules is the one whereby haulage by electric locomotives on the overhead trolley-wire system is prohibited underground in any coal-mine, and while this rule does not apply before the 1st day of April, 1930, to any overhead trolley-wire system in use underground before the 1st day of January, 1925, it has the effect of stopping this dangerous and obsolete system from being installed in new mines.

VENTILATION.

The District Inspectors' reports give details regarding the ventilation in the splits and main returns of the various mines. In one or two instances demands had to be made during the year for increases in the amount of air being circulated in a few of the splits in a few mines, but on the whole the provisions requiring adequate ventilation were generally well observed at the different mines.

USE OF BURRELL GAS INDICATOR.

As in former years, the Burrell Gas Indicator, the approved tester to determine lower percentages of methane in the atmosphere than can be determined by the ordinary flame safety-lamp, was in general use at the mines during 1925, and the same method was adopted as in previous years to determine its efficiency—namely, a series of comparative tests were made by the District Inspectors of Mines simultaneously with the collecting of mine-air samples for analysis. A check of the results obtained by each method is then made.

The following statistical table shows the results obtained:—

District.	Gas Sample taken and submitted by Inspector.	No. of Samples tested.	Average Percentage of Methane.	
			By Chemical Analysis.	By Burrell Gas Indicator.
			Per Cent.	Per Cent.
Vancouver Island	T. R. Jackson	22	0.22	0.27
East Kootenay (Michel)	John MacDonald	20	0.73	0.73
East Kootenay (Coal Creek)	John MacDonald	66	1.20	1.32

The above comparative analyses, combined with those made in previous years, show the practical utility and accuracy of the Burrell Gas Indicator as used in the Province.

The details of all the individual tests from which these averages are made up are on file in the office of the Chief Inspector of Mines.

INSPECTION COMMITTEES.

Generally throughout the Province the workmen have taken advantage of the privilege granted under General Rule 37, section 101, "Coal-mines Regulation Act," to appoint one or two of their own number to inspect the mines. These inspections have been made once a month.

MINE-AIR SAMPLING.

Mine-air sampling was carried out as usual during the year and 273 mine-air samples were collected in the coal-mines of the Province. Of this number, forty-nine were spoiled in transit and accidents in the laboratory.

Much valuable information has been obtained and added to that obtained in previous years relative to the flow of methane from the various coal-seams at the different collieries.

The following table shows the analysis of mine-air samples taken in the various splits and main return airways of the coal-mines in the Province during 1925 (the detailed analyses of mine-air samples taken in other portions of the various mines are on file in the office of the Chief Inspector of Mines):—

RETURN FROM MINE-AIR SAMPLES TAKEN IN THE VARIOUS SPLITS AND MAIN RETURN AIRWAYS OF THE COAL-MINES OF THE PROVINCE DURING THE YEAR 1925.

Sample No.	Date.	Mine.	Ventilating District.	Working or Idle.	Tonnage per Day.	Tonnage of Split per day.	Chemical Analyses.				Velocity of Air in feet per Minute.	Quantity of Air in Cubic feet per Minute.	Barometer.	Hygrometer.			Cubic feet of Methane per Minute.	Cubic Feet of Methane per Day.	Cubic Feet of Methane per Ton.	Tons Methane per Day.
							CO_2.	O.	CH_4.	N.				Wet Bulb.	Dry Bulb.	Humidity.				
		Vancouver Island.																		
199	Jan. 20	Cassidy.....	Main return	Working ...	650	....	0.10	20.81	0.24	78.85	1,000	150,000	29.46	44.0	44.0	100.0	360	518,400	797	11.12
205	Feb. 12	No. 4 Comox (C.C.)	No. 1 Slope return	" ...	950	500	0.35	20.35	0.31	78.99	440	61,600	29.30	....	....	.....	191	275,040	550	5.90
206	" 12	" "	No. 2 Slope return.....	" ...	950	450	0.26	20.39	0.22	79.13	1,350	90,000	29.30	....	....	.....	198	285,120	633	6.11
235	June 2	Reserve (W.F.C.) ...	Main return...	" ...	650	....	0.15	20.60	0.46	78.79	650	26,000	29.80	....	...	.....	120	172,800	266	3.70
261	Aug. 29	No. 4, Comox (C.C.)	No. 1 Slope return.....	" ...	900	450	0.35	20.19	0.27	79.19	450	61,300	29.40	58.0	58.0	100.0	165	237,600	528	5.09
262	" 31	Cassidy.	Main return	" ...	700	...	0.14	20.58	0.44	78.84	1,000	150,000	30.00	50.0	50.0	100.0	660	950,400	1,357	20.35
189	Nov. 30	"	"	" ...	400		0.13	20.66	0.36	78.85	1,000	130,000	29.90	50.0	50.0	100.0	468	673,900	1,684	14.45
293	Dec. 22	No. 1 mine (W.F.C.)	Main South return.. ...	" ...	1200	410	0.46	20.03	0.17	79.34	500	27,000	30.00	50.0	50.0	100.0	46	66,240	165	1.42
294	" 22	" "	Main return.....	" ...	1200	800	0.43	19.89	0.18	79.50	600	58,000	30.00	....	....	.....	104	149,760	187	3.21
295	" 22	" "	No. 3 return.....	" ...	1200	200	0.27	20.28	0.19	79.26	400	16,000	30.00	.. ..	....	.....	30	43,200	216	1.72
298	" 28	No. 4, Comox (C.C.)	No. 2 Slope return.....	" ...	1000	450	0.46	20.08	0.40	79.06	1,000	58,000	29.60	....	.. ..	.....	232	334,080	742	7.16
299	" 28	" "	No. 1 Slope return.....	" ...	1000	550	0.40	20.11	0.30	79.19	1,100	62,000	29.40	...	...	.....	186	267,840	487	5.74
29D	Mar. 24	East Wellington	Main return.....	" ...	200	....	0.06	20.61	0.72	78.61	250	20,000	30.40	....	....	. ...	144	207,360	1,036	4.44
30D	April 1	Wakesiah.	"	" ...	350	....	0.23	20.43	0.62	78.74	400	26,000	30.50	....	....	.....	156	224,640	641	4.82
31D	March 26	Lantzville	"	" ...	350	....	0.16	20.58	0.22	79.04	500	40,000	30.00	....	....	.....	88	126,720	362	2.72
34D	April 1	East Wellington....	"	" ...	150	...	0.15	20.55	0.95	78.35	250	20,000	30.35	....	....	.....	190	273,600	1,820	5.86
37D	May 20	" "	"	" ...	150	....	0.16	20.46	0.88	78.50	200	20,000	30.00	...	....	.....	176	253,440	1,689	5.44
46D	Sept. 24	Wakesiah.	Slope return..	" ...	200	100	0.22	20.38	0.69	78.71	300	12,000	30.00	....	...	....	83	119,520	1,195	2.56
53D	Dec. 10	East Wellington	Main return	" ...	250	....	0.12	20.26	1.69	77.93	210	21,000	29.60	....	....	.....	355	511,200	2,045	10.96
54D	" 23	Wakesiah.....	Lewis return..... ...	" ...	400	150	0.20	20.54	0.18	79.08	200	10,000	30.00	....	....	.....	18	25,920	173	0.55
		Michel.																		
525	May 15	No. 3 mine	Main return	" ...	750	....	0.20	20.51	0.73	78.56	800	80 000	26.40	51 0	51.0	100.0	584	840,960	1,121	15.55
530	June 19	No. 3 East mine ...	"	Idle	....	....	0.13	20.68	0.34	78.85	1,200	75,600	26.30	52.0	52.0	100.0	257	370,080	.....	.....
535	Aug. 24	No. 3 mine	Slope return.....	Working....	800	180	0.10	20.75	0.46	78.69	450	29,250	26.30	50.0	50.0	100.0	135	194,400	1,080	3.59
536	" 24	"	Main return.....	" ...	800	...	0.19	20.55	0.57	78.69	1,160	110,000	26.30	52.0	52 0	100.0	627	902,880	1,128	16.70
542	" 26	No. 8 mine	"	" ...	711	..	0.36	20.34	0.22	79.08	600	60,000	25.30	56.0	56.0	100.0	132	190,080	267	3.51
545	Oct. 16	No. 3 East mine....	"	Idle.....	....	...	0.18	20.56	0.55	78.71	1,400	88,200	26.28	50.0	50.0	100.0	485	698,400	.....	.....
		Coal Creek Colliery.																		
1301	Jan. 5	No. 3 mine	"	Working ...	325	....	0.22	20.51	0.75	78.52	900	54,000	25.25	64.0	64.0	100.0	405	583,200	1,791	10.78
1354	Sept. 15	No. 1 East mine....	No. 1 South return....	" ...	690	255	0.19	20.10	2.53	77.18	340	25,500	25.60	59.5	60.0	97.0	645	928,800	3,642	17.18
1357	" 16	" ...	West return	" ...	690	165	0.16	20.52	0.69	78.63	260	18,200	25.70	56.0	57.0	93.0	126	180,440	1,093	3.38
1358	" 16	"	Main North return.....	" ...	690	525	0.19	20.43	1.29	78.09	1,170	105,300	25.70	57.5	88.0	97.0	1,358	1,955,520	3,724	36.17
1361	" 16	"	No. 1 South return.....	" ...	690	255	0.24	20.03	2.58	77.15	340	25,500	25 70	60.5	61.0	97.0	658	947,520	3,715	17.52
1374	Oct. 6	" ...	" "	" ...	690	255	0.19	20.39	1.66	77.76	370	27,750	25.95	60.0	61.0	93.0	460	662,400	2,597	12.25
1375	" 10	" ...	No. 2 South return	" ...	690	150	0.11	20.46	1.51	77.92	280	25,200	26.20	53.0	55.0	89.0	378	544,320	3,628	10.06
1377	Nov. 2	No. 1 South mine...	No. 1 Split return.....	" ...	420	140	0.28	20.20	1.43	78.09	320	19,200	25.70	61.0	51.0	100.0	275	396,000	2,828	7.32
1381	" 25	No. 1 East mine.....	No. 2 South return.....	" ...	690	150	0.10	20.46	1.10	78.34	250	22,500	25.60	54.0	84.0	56.5	247	211,680	1.411	3.91
1382	" 25	"	No. 1 North return.....	" ...	690	120	0.11	20.52	1.08	78.28	260	20,800	25.60	53 0	53.0	100.0	225	180,000	1,500	3.33
1390	Dec. 28	No. 3 mine	Slope return..	" ...	400	375	0.22	20.41	1.22	78.15	750	37,500	25.75	66.0	66.5	96.0	475	658,080	1,645	12.17
38	May 12	No. 6, Corbin.....	Main return	" ...	140	....	0 09	20.84	0.14	78.93	150	6,900	26.00	44.0	44.0	100 0	9.6	13,824	98	0.25

COAL-DUST.

During 1925 regulations for precautions against coal-dust were put into force pursuant to the provisions of the "Coal-mines Regulation Act."

The floor, roof, and sides of every road or part of a road which is accessible must now be treated in one of the following ways: Either they shall be treated with incombustible dust in such manner and at such intervals as will ensure that the dust on the floor, roof, and sides respectively shall always consist throughout of a mixture containing not more than 50 per cent. combustible matter; or they shall be treated with water in such manner and at such intervals as will ensure that the dust on the floor, roof, and sides respectively is always combined throughout with 30 per cent., by weight, of water in the intimate mixture.

Tests of samples of dust, so taken as to be representative of the normal composition of the dust throughout the roads of the mine on the floor, roof, and sides respectively, shall be made as often as may be necessary, but not less frequently than once a month.

The results of the tests shall be posted at the entrance to the mine and recorded in a book to be kept at the mine for the purpose.

Since the passing of the regulations for precautions against coal-dust the operating companies have been giving this matter great attention, and through courtesy from them the Chief Inspector of Mines' office is furnished with copies of all tests made. Practically all the coal-mines in the Province have now got their roadways up to standard required by the regulations.

EXPLOSIONS.

There were no explosions or ignitions of gas or coal-dust during the year.

SULPHUR-POISONING.

Cases of sulphur-poisoning were not so numerous or acute during 1925 as in previous years; however, investigations have been continued throughout the year with a view of trying in some way to minimize the effect of this painful infliction on the workmen.

It is hoped that with data now available it will be possible to work out a system of detection of this gas when it is present in the atmosphere in percentages that are injurious, and a withdrawal point set as in the case of inflammable gas.

DANGEROUS OCCURRENCES.

During 1925 there was reported, as provided for by section 71, subsections (*c*) to (*h*), thirty-eight dangerous occurrences, as follows: Outbursts of coal and gas, 27; bumps, 2; mine fires, 3; fires through defective electrical apparatus, 4; heavy cave closing airway, 1; breakage of hoisting apparatus, 1.

Of the twenty-seven outbursts of coal and gas reported, none of them was violent and they all gave plenty of warning and the workmen were withdrawn; some of them, however, did give off large quantities of gas and in one or two cases upwards of 150 tons of coal was displaced.

None of the mine fires assumed serious proportions, except the one which occurred in the Coalmont Colliery, which is dealt with fully in Inspector Briggs's report. Three of the fires reported due to defective electrical apparatus occurred right at the working-faces, which indicates the most careful supervision is necessary when electrical apparatus is used at the coal-face, both in the inspection of equipment and for inflammable gas.

ORDER STOPPING WORK UNDER AUTHORITY OF SECTION 87.

In one or two instances during the year stoppage of work was ordered by the District Inspectors in districts of various mines until proper remedies were applied for safeguarding those employed. Usually a willing spirit of co-operation was shown by the various managements at the different collieries to apply remedies when requested.

PROSECUTIONS UNDER "COAL-MINES REGULATION ACT."

During the year there were twelve prosecutions made, ten of which resulted in convictions and two in dismissal with a caution by the Magistrate. Details of the cases are given in the list published at the end of this report.

MINE-RESCUE AND TRAINING.

More interest has been taken in mine-rescue work during 1925 than in the previous years. Thirty-three certificates of competency for mine-rescue work have been granted during the year, and a good many who received their certificates a few years ago took a course of retraining with the more modern type of apparatus.

Six officials who are physically unfit to take a course of training took a course of lectures on the assembling and handling of the apparatus.

LIST OF PERSONS WHO WERE GRANTED MINE-RESCUE CERTIFICATES, 1925.

Name.	Where trained.	Cert. No.	Name.	Where trained.	Cert. No.
Edward Morrison	Fernie	568	William Muir	Middlesboro.	585
James W. Ashmore	"	569	William Foster	"	586
John Monks	Cumberland	570	Henry Horn	"	587
Thomas Brown	"	571	William Richardson	"	588
Samuel Williams	"	572	Thomas Gibson	"	589
William Jackson	"	573	James Whirter	"	590
Jas. D. Robertson	"	574	John Devlin	Nanaimo	591
Joseph Zanini	"	575	George E. Jardine	"	592
John Virgo	Fernie	576	Thomas J. Wood	"	593
George Elmes	"	577	George H. Perry	"	594
Percy Elmes	"	578	George F. Nash	"	595
William Chapman	"	579	John Sweeney	Fernie	596
Herbert S. Clarke	"	580	Joseph Graham	"	597
James Dorman	"	581	Alfred R. Williams	"	598
George Murray	Middlesboro	582	Arthur Hilton	"	599
Jos. Thomson	"	583	James Hall	"	600
Thomas Walker	"	584			

LIST OF PERSONS WHO HAVE RECEIVED SPECIAL CERTIFICATES FOR COURSE OF LECTURES DURING 1925.

Name.	Where Lectures were given.	Name.	Where Lectures were given.
Joseph Dean	Nanaimo.	William Wilson	Nanaimo.
William Bradley	"	Jonathan Pearson	"
James M. Brown	"	Alexander Coombs	"

During 1925 there was added to the equipment at the Government Mine-rescue Stations twelve Burrell All Service Masks and three H.H. Inhalators.

There are now kept ready for use at the mines and in the Government Mine-rescue Stations 100 sets of mine-rescue apparatus and resuscitating devices. There has been issued a total of 600 certificates of competency in mine-rescue training and eighteen special certificates to officials physically unfit to stand the training, but who have taken a course of lectures fitting them to handle rescue crews in cases of emergency. There were employed in and about the coal-mines of the Province during the year 5,443 persons, and there was a mine-rescue or resuscitating device for every fifty-four persons employed, and nearly 10 per cent. of the total persons employed have certificates of competency in mine-rescue work.

The operators and workmen are urged to make further investigation of the possibility of saving lives in the event of mine explosions by extensive use of the Self Rescuer.

FIRST-AID WORK.

The interest in this work was well maintained in all the coal-mine sections of the Province, and it is very gratifying to notice the interest taken by the younger people in this work.

An incident well worthy of special notice occurred at the annual field-day meet in Nanaimo on Labour Day. The second prize in the open event for the Department of Mines' Cup was taken by a team composed of father and four sons—George Carson, William Carson, James Carson, John Carson, and George Carson, Jr. In the two-man event the first prize was taken by father

and son, Walter Wharton and Chas. Wharton, and the Juvenile Cup was won by two sons out of the same family, Leonard Wharton and Sidney Wharton. George Carson, Sr., and William Carson were also members of the mine-rescue team which won second prize.

MINE-RESCUE AND FIRST-AID COMPETITIONS.

The East Kootenay Mine Safety Association held its annual mine-rescue and first-aid contest, in which a keen interest was taken, at Fernie on August 1st, 1925. Seven teams were entered for the mine-rescue events, but two failed to appear, leaving five teams to actually compete. Coal Creek No. 1 team (John Caufield, captain) took first prize and were thereby entitled to go to the Coast and compete in the mine-rescue contest held at Nanaimo. Fernie No. 2 team won second prize and Michel No. 1 team third prize.

In the first-aid events six teams took part; Coal Creek No. 2 team took first place, Fernie No. 1 team second place, and Coal Creek No. 1 team third place.

The Vancouver Island Mine Safety Association held its ninth annual field competitions in mine-rescue work and first aid at Nanaimo on Labour Day, September 7th. Five teams took part in the mine-rescue competitions. The first prize and Department of Mines' trophy was taken by the Fernie team (John Caufield, captain), who were also the first-prize winners of East Kootenay contest; second prize was won by Ladysmith team (George Carson, captain).

In the first-aid events the first prize and Department of Mines' Cup was won by the Granby, Cassidy, team (Alex. McLacklin, captain); second prize, Extension team (George Carson, captain, and four sons members of the team).

The Coulson Cup was won by the Cumberland team (William Beveridge, captain); second prize, Nanaimo team (David Simpson, captain).

Two-man event was won by a Nanaimo team composed of father and son, Walter Wharton and Charles Wharton. One-man event was won by William Beveridge, Cumberland; second prize being taken by Robert Reid, also from Cumberland. The Juvenile Cup was won by two brothers, Leonard and Sidney Wharton.

These two mine-rescue and first-aid competitions, held annually, are made possible by substantial grants from the Mines Department; the use of all the Government apparatus from the various mine-rescue stations is granted to the associations, together with the assistance of the Instructors.

The training in the mine-rescue and first-aid work requires a good deal of time and patience and those who take these courses deserve great credit for their interest in this branch of work intended to relieve those injured in or about the mines.

It was rather disappointing to notice that, even though the Vancouver Island Mine Safety Association's competitions were held in Nanaimo, no mine-rescue team from Nanaimo took part in the competitions. It is to be hoped that more interest will be taken in the above-named community in future in this class of work, the object of which is to safeguard life and property.

EXAMINATIONS FOR CERTIFICATES OF COMPETENCY.

Two *examinations for certificates of competency for coal-mine officials* were held during 1925; details of these examinations are dealt with in the report of the Secretary to the Board.

Examinations for certificates of competency as coal-miners were held regularly during 1925 at the various mines.

SUPERVISION OF COAL-MINES.

During 1925 sixteen coal companies operated seventeen collieries, with forty mines, employing 3,828 men underground.

In the supervision of underground employees there were twenty-one managers, three safety engineers, thirty-one overmen, 157 firebosses and shotlighters, a total of 212 officials, or one official for eighteen persons employed underground.

METALLIFEROUS MINES.

PRODUCTION.

The output from the metalliferous mines for 1925 was 3,849,269 tons, an increase of 452,164 tons over the tonnage for 1924. This tonnage was produced from ninety-three mines, of which thirty-three shipped 100 tons or more.



Coal Prospect, Kamloops M.D.



Suquash, Location of First Coal Mined in B.C. in 1835. Right: Chief Inspector of Mines, George Wilkinson.

ACCIDENTS IN METALLIFEROUS MINES.

There were five fatal accidents in and around the metalliferous mines during 1925, causing the death of five persons, a decrease of five in the number of fatalities compared with the figures of 1924.

There were 5,118 persons employed in and about the metalliferous mines, an increase of 1,085 persons compared with the figures for 1924.

The ratio of fatal accidents per 1,000 persons employed was 0.97, compared with 2.48 for 1924. The ratio for the last ten-year period was 2.44.

The tonnage mined per fatal accident was 769,854 compared with 339,710 tons per fatal accident for 1924. The tonnage mined per fatal accident for the last ten-year period was 270,192.

The following table shows the mines at which fatal accidents occurred during 1925 and comparative figures for 1924:—

Mining Division.	Mine.	No. of Accidents.	
		1925.	1924.
Vancouver	Britannia	2	2
Portland Canal	Premier	..	2
Fort Steele	Sullivan	1	1
Nass River	Hidden Creek	..	3
Trail Creek	Le Roi	..	1
"	Centre Star	..	1
Slocan	Bosun	1	..
Similkameen	Copper Mountain	1	..
Totals		5	10

The following table gives the cause and percentage to the whole of the fatal accidents, with corresponding figures for 1924:—

Cause.	1925.		1924.	
	No.	Per Cent.	No.	Per Cent.
Falls of ground	..	.....	2	20.00
Mine-cars and haulage	..	.....	2	20.00
Explosives and blasting	1	20.00	3	30.00
Falling down raises, stopes, and chutes	3	60.00	2	20.00
Miscellaneous (underground)	1	20.00	..	.....
Miscellaneous (surface)	..	.....	1	10.00
Totals	5	100.00	10	100.00

Details surrounding the occurrence of fatal accidents in and around metalliferous mines during 1925 were:—

The fatal accident which occurred to Joe Plecas in the *Britannia* mine, operated by the Britannia Mining and Smelting Company, on March 10th, 1925, was caused as follows: Plecas and his partner, Mina, who were employed as trammers, were drawing No. 96 chute, Perry stope. A large boulder blocked the chute about 15 feet above the door. They attempted to dislodge the boulder by bulldozing. Apparently Plecas prepared the charge and lit the fuse and both men retired to a safe distance; the charge failed to go off and after waiting some time they returned to the place and had taken the charge down from its position, and Plecas told Mina to get a fresh fuse and cap, and simultaneously with him making this request the charge exploded and killed him instantly. Whether the explosion was caused by a delayed fuse or from rough handling of the detonator is unknown.

The fatal accident which occurred to Emil Kaski, a miner, on July 14th, 1925, in the *Britannia* mine, operated by the Britannia Mining and Smelting Company, was caused by him falling through a 14-inch grizzly, which was over the chute, to the muck-pile 18 feet below. Deceased had probably been in the act of picking up a drill which was near the chute set, and had either

slipped or tripped and fell as mentioned above, receiving injuries from which he died three days later.

The fatal accident which occurred to Angus Livingstone, a miner, on August 3rd, 1925, in the *Sullivan* mine, Kimberley, operated by the Consolidated Mining and Smelting Company, was caused as follows: Livingstone was standing under top bulk-head, which he was going to repair by putting sprag under broken end stull. His partner entered the stope to get a shovel, and when handing it to Livingstone the muck started to run, the weight causing the bulk-head to collapse, crushing Livingstone.

The fatal accident which occurred to P. T. Reid, a mucker, on October 24th, 1925, in the *Bosun* mine, New Denver, operated by the Rosebery Surprise Mining Company, was caused by him falling down a raise. Deceased had gone up to an intermediate level without instructions from foreman and was known to have started down the ladder from this level. He was found lying at the bottom of the raise and sent to the hospital at Sandon, where it was found his skull was fractured, which resulted in death.

The fatal accident which occurred to Olaf Emanuel Anderson, a machine-miner, on November 25th, 1925, in the *Copper Mountain* mine, operated by the Allenby Copper Company, was caused by him falling down a stope. Deceased had apparently finished barring down loose rock, preparatory to setting up his machine, and was fixing a trail along the side of the stope. In some way he lost his balance and rolled down the slope into the raise; thence down the raise for approximately a distance of 100 feet.

There were two other deaths to employees not mentioned above; one person who had two ribs broken died twenty-one days later from heart-failure; the other died from shock following an operation. The injuries in neither of the above two cases was the immediate cause of death.

There was a total of thirty-one accidents reported under the requirements of section 19, "Metalliferous Mines Regulation Act." An analysis of the causes show that fully 70 per cent. were preventable, if the injured persons had exercised more care.

VENTILATION.

The District Inspectors report that the ventilation of the metalliferous mines was fairly well maintained throughout 1925.

MINE-AIR SAMPLING.

During 1925, as in previous years, mine-air samples were frequently taken in the metalliferous mines of the Province; much valuable information has been obtained from these samples and added to that previously obtained relative to the hydrogen, carbon-monoxide, and carbon-dioxide contents of the atmosphere in the metalliferous mines.

MINE-RESCUE WORK.

During 1925 one of the larger operating companies installed four Burrell All Service Masks and one H.H. Inhalator resuscitating device.

The total number of mine-rescue apparatus kept at the metalliferous mines of the Province is now twenty-nine and resuscitating devices fifteen.

FIRST-AID WORK.

First-aid work at the metalliferous mines of the Province has been fairly well maintained during the year and much interest shown in the safety-first movement for accident-prevention and welfare of the employees. The District Inspectors give details of the work accomplished on these lines in their annual reports.

CONCLUSION.

I desire to express my appreciation of the faithful co-operation and assistance afforded during the year by the District Inspectors and Instructors in mine-rescue work. I also wish to thank the management and employees at the various collieries for the assistance and support given in making operations as safe as possible and look forward to a continuation of the same during the coming year. It is only by the closest and efficient co-operation of all parties concerned that we can keep down the number of accidents and make the mining industry a safer and more congenial occupation.

I am much indebted to the Director of the Mines Branch at Ottawa for co-operation in the work of mine-air sampling, and the Dominion Government for furnishing the sample-bottles and making all analyses free of charge.

REPORTS OF METALLIFEROUS MINES INSPECTORS.

PERSONNEL OF STAFF WITH DISTRICTS.

GEORGE WILKINSON, CHIEF INSPECTOR (HEADQUARTERS, VICTORIA).

Northern Inspection District.—T. J. Shenton, Inspector (Headquarters, Prince Rupert).
Southern Coast Inspection District.—James Dickson, Inspector (Headquarters, Victoria).
Vancouver Island Inspection District.—James Dickson, Inspector (Headquarters, Victoria).
Nicola-Princeton Inspection District.—John G. Biggs, Inspector (Headquarters, Merritt).
West Kootenay and Boundary District.—H. H. Johnstone, Inspector (Headquarters, Nelson).
East Kootenay and West Kootenay and Boundary Districts.—Robert Strachan, Senior Inspector (Headquarters, Fernie).

NORTHERN INSPECTION DISTRICT.

REPORT BY T. J. SHENTON, INSPECTOR.

I have the honour to submit my annual report for the year 1925 for the Northern Inspection District, including the following Mining Divisions: Atlin, Portland Canal, Nass River, Omineca, Queen Charlotte, and Skeena.

ATLIN MINING DIVISION.

Engineer. Operated by the Engineer Gold Mines, Limited, Inc. Charles V. Bob, president, New York City; L. P. Julien, secretary, New York City; Arthur C. Brinker, manager; F. Collins, mine superintendent; R. Brooks, mill foreman. The mine is situated on Taku arm, Atlin district, some 65 miles from Carcross, Yukon Territory, and is reached by boat from Carcross, which connects with a train direct from Skagway over the White Pass Railway.

At this mine there is very creditable camp accommodation for the employees. Two large bunk-houses of modern type have been completed during the year and a number of houses have been erected. A hospital has been built and the resident doctor arrived early in the fall of the year. In addition, provision for first aid has been fully made by the management.

At the time of the last visit the management was making preparations to provide a dry-room and wash-room for the employees. Separate places as wash-rooms had already been attached to the new bunk-houses and a water-supply of good quality arranged for. The accommodation in camp buildings and sanitary arrangements in every detail has been properly cared for by the management.

The average number of men employed daily for the year was 100, but on the last visit of inspection the number was 140, due to extra numbers engaged in various kinds of surface construction-work. A 200-kw. hydro-electric plant which was installed during the year 1924 was in operation during the past year. The mill was being enlarged by the installation of an additional ball-mill and a new classifier. The ore-body was being blocked out in readiness for a full operation and shipment of the product. The system of mine-work chosen by the management is what is known as the "underhand-stoping system."

The management has sought to meet the requirements of the "Metalliferous Mines Regulation Act" and in this matter gratification is felt for the ready co-operation shown.

Andrew Sostad, the manager during the year 1924, was succeeded by A. C. Brinker.

Atlin Silver-Lead Mines. This property, it is understood, is under option to the Federal Mining and Smelting Company; J. Ruffner, manager; W. Pinie, mine superintendent. This mine is situated some 14 miles north-east of the city of Atlin and is located on the west side of Vaughan mountain at an elevation of 5,200 feet. At the time of visiting there were ten men employed. Adequate provision is made for the accommodation of the employees, and although of a rough type it was sufficient and in a condition fairly sanitary. The mine operations were carried on in fair recognition of the requirements of the "Metalliferous Mines Regulation Act."

Discovery Placer. Operated by the Discovery Mining and Power Company; A. C. Brinker, general manager; A. Sostad, superintendent. At the time when visited there was employed twenty-seven men and the work being carried out was the laying of a steel pipe 1,000 feet in length and 3 feet in diameter, also the laying-down and construction of a wood flume 1,500 feet to connect source of water-supply with new point of diggings chosen for operation. The management has provided some of the buildings located in the original Discovery camp as accommodation for the employees, which were quite suitable and adequate.

Ruby Creek Placer. Operated by the Placer Gold Mines Company; officers in charge were C. E. Lenard and C. H. Titus. Six men were employed at the time of visit and the work in hand was the removal of the collected gravel at foot of creek that had been washed down from the original workings farther up the creek. This was being done in order to open up a piece of underground placer on the north side of the creek, beneath the lava-flow. One large monitor was in operation at the time. The men are fairly well provided with accommodations for sleeping and eating, all of which were found to be sanitary.

Owing to not having much time it was only possible to visit the two above-mentioned placer operations, which are the most important ones.

PORTLAND CANAL MINING DIVISION.

SALMON RIVER SECTION.

Indian. Operated by the Indian Mines Corporation, Limited; F. J. Ritchie, general manager; W. S. Orr, mine superintendent. Operations began October 28th, 1925, eight men being employed; subsequently the number was reduced to five. Some small amount of stoping had been done and about 58 tons of ore had been sacked ready for shipment. This will be transported some 13 miles overland to tide-water at Stewart for shipment by boat. Work of this character or the sacking of further ore was discontinued at the end of the year. Some 36 tons of ore was shipped from the mine early in the year to the Swansea smelter, Wales. During the same period 2,200 feet of diamond-drilling was accomplished.

Operations have been carried on in compliance with the "Metalliferous Mines Regulation Act." Accommodations for the men have so far been temporary, yet fairly adequate.

Big Missouri. Operated by the Big Missouri Mining Company; G. J. Hosgood, president; H. A. Hinton, general manager; P. E. Peterson, mine superintendent; Emil Olson, mine foreman. There are employed on this operation at the present time twenty men. Development-work consists of tunnelling and stripping. Accommodations for the employees are not altogether satisfactory. Operations commenced late in the fall of the year and is the reason for such conditions, but the management has promised to improve same as soon as weather conditions will permit.

Conditions in the mine were found to be in fair order and in accordance with the requirements of the "Metalliferous Mines Regulation Act."

B.C. Silver. Operated by the B.C. Silver Mines, Limited; C. A. Banks, general manager; C. B. North, superintendent; G. Crighton, mine foreman. This mine worked continuously throughout the year. Development-work carried out during the year on this property consisted of diamond-drilling operation and the driving of tunnel, crosscut, and raise. A short improvised aerial tram has been constructed leading from the mine dump to a point on the main road leading from the *Premier* mine, and quite a large quantity of sacked ore was stored in a shed at the foot of the aerial tramway, awaiting shipment to tide-water at Stewart.

A new compressor of larger type than those in use will be installed at an early date. A new office building was under construction late in the year. The accommodations for the employees are fairly adequate and good. Operations have been carried on in compliance with the "Metalliferous Mines Regulation Act."

Premier. Operated by the Premier Gold Mining Company, Limited; D. L. Pitt, general manager; B. Smith, assistant general manager; H. MacDonald, mine superintendent. This mine has operated continuously throughout the year and the activity in building and installation of additional power-machines has been carried out on a large scale. The mill has been increased from 200 to 400 tons a day and, similarly, the capacity of

the power plant has been doubled. The power-plant capacity, when improvements are completed early in 1926, will be 3,500 horse-power.

Camp accommodations are very good for employees, and in addition to good bunk-houses there is under construction an athletic hall, which it is expected will be completed at an early date.

Under able management the mine operations have been carried on in strict compliance with the "Metalliferous Mines Regulation Act."

The *Glacier Creek*, *Forty Nine*, and many other small operations, some of which closed down permanently or operated intermittently, were not visited.

BEAR RIVER SECTION.

Dunwell. Operated by the Dunwell Mines, Limited; R. M. Stewart, president; T. S. McPherson, vice-president; A. Little, superintendent; H. G. White, assayer. In the month of December, 1924, this mine ceased operations temporarily owing to an excess of frost which cut off the source of water used as power in the air-compressor. Operations recommenced October 19th, 1925, and on the last visit of inspection for the year there was employed daily seventeen men; subsequently this number had been increased to twenty-five.

The company decided to ship ore from the mine immediately and tenders for the contract for haulage of ore from the mine to tide-water were issued by the company early in the month of December. The company has decided to construct a 100-ton mill and to connect the mine with same by the instalment of an aerial tram during 1926. The present undertakings of the company augur well for this property in the coming year.

On all visits of inspection during the past year it has been found the management was ready to co-operate in the application of the "Metalliferous Mines Regulation Act."

Lakeview. Operated by the Lakeview Mines, Limited (Stewart, B.C.); R. F. Hill, general manager; J. Marshall, mine foreman. Operations ceased temporarily on August 8th, 1925, and the property remained idle for the remainder of the year. Prior to closing down six men were employed daily. Operations have always been carried on to meet the requirements of the "Metalliferous Mines Regulation Act."

Prince John and Mobile.—Neither of these properties has been in operation during the current year.

MARMOT SECTION.

Porter-Idaho. Operated by the Porter-Idaho Mining Company, Limited; C. Porter, general manager. Immediately after the snow had melted from the trails, making possible the transportation of material by pack-train from the mine, work was commenced. The mine was visited on August 17th, 1925, and at that time eleven men were employed. The shipping of ore had begun.

Trails leading to this property were in fair condition for travel, except the course across the glacier in the valley of the North fork, which must be crossed for nearly a quarter of a mile to reach the mine. The sun was hot and the flow of water over the surface of the glacier was sufficient to eliminate all traces of a track across the huge body of ice, which was filled at its extremities with large open crevices that were a menace to travellers. Considerable aid would be given to safe travel in such instance if only the paths entering upon and leaving the glacier at its extremities could be kept in better order during operation of the *Porter-Idaho* mine. Men injured must be transported over this glacier and a better track to enter upon and to leave the glacier would be a great help in case of any one receiving injuries that would necessitate their removal to outside points.

Shipments from the mine ceased on October 25th. The mine is continuing operations throughout the winter, six men being employed. The management informed me that shipments of ore will begin early in the spring of 1926.

Some improvements have been made to the camp buildings during the past year and further improvements, both in operating conditions and camp buildings, have been promised by the management.

The management has always been found willing to make the necessary improvements to meet the requirements of the "Metalliferous Mines Regulation Act."

PORTLAND CANAL SECTION.

Outsider. Operated by the Granby Consolidated Mining, Smelting, and Power Company, Limited, under contract. Contractors: Carl Eklund, surface superintendent; J. Jarvie, mine superintendent; V. Biscoe, first-aid man. This property has operated continuously throughout the year. V. Bengston, formerly mine superintendent, vacated the position on October 1st and his place was filled by J. Jarvie; also J. Sutherland, first-aid man, left the company and his place was taken by V. Biscoe.

Ore from this operation is shipped by barge to the company's smelter at Anyox. Camp accommodation is of the best and sanitary arrangements satisfactory. The average number of men employed daily for the year was thirty-five. Transportation of the injured by boat from the mine at Maple Bay to Anyox is a distance of 65 miles; arrangements are fairly adequate if left undisturbed, but recently some intimation has been received from the management of withdrawing the boat. After making protest against this, information relative thereto was sent to the Chief Inspector, who referred the matter to the Compensation Board to look into, and it is hoped the matter will receive the attention it deserves. Proper equipment in that of a room set apart for first-aid work, stretchers and other equipment, together with the engagement of an expert first-aid man, have received proper attention. The mine is operated in compliance with the requirements of the "Metalliferous Mines Regulation Act."

NASS RIVER MINING DIVISION.

OBSERVATORY INLET SECTION.

Golskeish. Operated by the Golskeish Mines, Limited; H. W. Heidman, manager; J. W. Ferguson, contractor. From the commencement of the year until November 4th the operation was directly under the charge of the manager; since that date the work has been carried on under contract. During December negotiations by the Granby Consolidated Mining, Smelting, and Power Company, Limited, were entered into for the possession of the property, which it is believed have resulted in the Granby Company acquiring the property.

It is the intention of the present owners to sink a shaft on the vein and develop the ore-body on a much larger scale. The property in which the vein is located is low-lying land bordered on the east by Observatory inlet and on the west by Deep bay or Sylvester harbour, about 3 miles distant from Anyox.

During the year a second Ingersoll-Rand compressor was installed, of 4-drill capacity, the development of the property having reached a stage where the mining equipment for efficient service had reached its limit and it had become necessary to install further equipment for a larger operation.

The average number of men employed daily during the year was ten. Better conditions in camp buildings for the employees have been made during the year and sanitary conditions are fair. The property up to the end of the year has been operated on a small scale, and operations have been conducted in a very satisfactory manner and in keeping with the "Metalliferous Mines Regulation Act."

Hidden Creek. Operated by the Granby Consolidated Mining, Smelting, and Power Company, Limited; J. T. Crabbs, president; C. Bocking, vice-president and general manager; R. Plommer, treasurer; W. R. Lindsay, general superintendent; J. A. Swanson, mine superintendent; W. J. Coulter, assistant mine superintendent; C. Cook, mine foreman. This mine has operated continuously throughout the year. Several changes in the official staff of the company have taken place during the current year. Early in the year H. Munro, general manager, left the company and his place was filled by Charles Bocking. At the end of 1925 J. B. Haffner, assistant general manager, left the company's service and his place was taken by W. R. Lindsay. The employees of the company expressed in no uncertain manner their well-wishes for the future of both officers, who were held in high esteem by all.

The average number of men employed daily for the year was 356, and the tonnage is believed to be the largest yet mined by the company, amounting to 1,163,258 dry tons, a very creditable showing indeed and one that reflects great credit upon the management in all its branches with regard to the mine operations.

First-aid classes are conducted by the resident doctors each winter season and each official of the mine attends these classes, many of whom now possess the St. John Ambulance certificate of efficiency. Safety-first classes are held each month, which are also attended by the official

staff of the mine. This is very commendable and goes far to determine a minimum of accidents and a maximum of safety.

The management of the mine, in the persons of J. A. Swanson, J. Coulter, C. Cook, and the shiftbosses, is to be congratulated on the fact that no serious accident occurred during 1925.

During visits of inspection to this mine operations were found to be carried on to meet the full requirements of the "Metalliferous Mines Regulation Act" and for the prevention of accidents.

ALICE ARM SECTION.

Toric. Operated by the Consolidated Homestake Mining and Development Company, Limited; manager, A. C. Gerhardi. Operations were not continuous during the year. Early in March work ceased owing to the exhaustion of the powder-supply and the impossibility at the time of transporting supplies over the railway owing to heavy snow. As soon as conditions made it possible to transport supplies over the railway operations were recommenced, but ceased for the winter in August.

The average number of men employed daily was nine. As a temporary camp the accommodation for the employees is fair. Operations were found to be in compliance with the requirements of the "Metalliferous Mines Regulation Act."

La Rose. Neil Forbes, manager. This property is situated on the west side of the Kitsault river, 8 miles north of tide-water, and at an elevation of 2,200 feet on Haystack mountain. The average number of men employed daily is six. Operations are by tunnel and crosscut. Camp arrangements are fairly accommodative and sanitary. Operations of mine are carried on in compliance with the "Metalliferous Mines Regulation Act."

Esperanza. Owned by A. Armour and others, resident in Anyox: A. Armour, managing director; J. Fraser, mine foreman. Operation of the property ceased temporarily during June owing to the termination of contract under which the property had been operated up to that time. Operations recommenced on December 7th and continued to the end of year. A new contract for the operation of this mine had been let by the owners commencing December 18th, 1925, and terminating May 31st, 1926. The contract was given to five men, who are now operating under terms of this contract.

When last visited five men were employed and conditions of operation were in keeping with the requirements of the "Metalliferous Mines Regulation Act."

Standard. Bonded by the Granby Consolidated Mining, Smelting, and Power Company, Limited; E. C. Anderson, superintendent. This property is situated on McGrath mountain, about 6 miles north-west of Alice Arm. Operations began here on June 8th and terminated within a period of two months. When last visited four men were employed. Operations consisted of stripping and tunnelling, which were being carried on in compliance with the requirements of the "Metalliferous Mines Regulation Act."

QUEEN CHARLOTTE MINING DIVISION.

Owing to the information received that very little mining developments were being carried on it was considered unnecessary to visit this Division during the year.

OMINECA MINING DIVISION.

Henderson. Operated by Duthie Mines, Limited; J. R. Turner, manager; J. Nelson, mine foreman. After a lengthy period of idleness this property began operations again on June 16th; from that date it was in constant operation to the end of the year. The average number of men employed daily was forty and some high-grade ore was shipped.

A first-aid kit is kept ready for use and a qualified man in the person of F. Dunn is in charge of the first-aid work at the mine. Accommodations for the employees are very good and operations are carried on in compliance with the "Metalliferous Mines Regulation Act."

Silver Island. Operated by Silver Island Mining Company; E. F. Campbell, manager; H. J. MacDonald, mine superintendent. The number of men employed in and about the mine was ten. This mine is situated on Silver island, Babine lake, some 27 miles in a northerly direction from Burns Lake. When visited on July 8th it was discovered that the workings were proceeding in the direction of the lake. Realizing the necessity of a

careful survey of the workings being made, including the soundings of the lake, report was immediately made to the Chief Inspector, who also urged the management of the company to have a survey made with the least possible delay. Finding that it was thought to be unnecessary by the parties concerned and that the work was being delayed, the Chief Inspector suggested, and which was agreed to, that no part of the workings be allowed to proceed nearer the high-water level of the lake than 100 feet, and the management was notified accordingly. The company, notwithstanding requests, delayed the making of a survey, protesting the need of same; a copy of said survey requested to be made did not reach this office until the latter part of December, which was immediately dispatched to the office of the Chief Inspector for examination. Subsequently advice was received from the Chief Inspector requesting the cessation of all work approaching the lake in the *Silver Island* mine until soundings of the lake adjacent to the shore-line had been made and the proper data placed upon the survey-map. This order was duly sent by telegram to the manager of the company and a reply was received that the order had been obeyed by the stopping of all work.

In addition, the Chief Inspector having ruled off, and described on the survey-map of the *Silver Island* mine, the size of the barrier-pillars to be left in order to safeguard operations until soundings have been made of the lake adjacent to the shore-line, a copy of said blue-print thus described was sent to this office with the request that more blue-prints be made and to send a copy of said map, thus described and marked, to the management of the *Silver Island* mine. With the least delay these were obtained as requested and sent to the management.

Accommodations for the employees were found satisfactory and arrangements for storing powder and other operating conditions found to be in compliance with the requirements of the "Metalliferous Mines Regulation Act."

Taltapin. Operated by the Taltapin Mining Company, Limited; W. C. Stearman, president; A. Wood, managing director; G. Westman, secretary; A. Marlin, mine foreman. The entrance to the workings of the *Taltapin* property is by shaft, 7 by 8 feet and 70 feet deep; owing to cessation of work just previously, there was quite a depth of water in the shaft, making entrance to workings impossible at the time visited. The property is situated 6 miles south of the *Silver Island*. When in operation there was employed ten men in and about the mine.

Fiddler. This property is situated 4 miles north-west of the station of Dorreen on the Canadian National Railway. Operations were commenced on August 1st and closed down again on November 6th, 1925. No ore was shipped during the period of operation. The number of men employed daily during the period of operation was ten.

SKEENA MINING DIVISION.

COAST SECTION.

Belmont-Surf Inlet Mines. Operated by the Belmont-Surf Inlet Mines, Limited; J. Heller, president; F. H. Penn, manager; J. Matson, mine superintendent; E. Hawkins, auditor; J. Smith, engineer; H. C. McKenzie, resident doctor. The mine has been worked continuously throughout the year, but the staff has been considerably reduced owing to the gradual exhaustion of the ore-body existing between the 900-foot level upward to the 700-foot and then from the 530-foot again to the 320-foot level. The *Pugsley* also is finishing rapidly.

The first-aid work is in charge of C. O. Gustafson, who possesses a certificate of competency from the St. John Ambulance Society. The average number of men employed daily for the year was 120.

Considering the nature of the work is that of the extraction of the pillars, the mine has been very free from accidents during the past year. In all of the inspections made the operations have been found to be conducted in compliance with the "Metalliferous Mines Regulation Act."

Pugsley. This property is situated about three-quarters of a mile from the *Belmont-Surf Inlet* mine. The average number of men employed daily for the year in this mine was twenty. The operation has been supervised by the same officers as *Belmont-Surf Inlet* mine. All entrances to the mines of this company, on being finished, are barricaded off and up-to-date maps of the workings of both mines are being sent to the Honourable Minister of Mines in compliance with section 22, "Metalliferous Mines Regulation Act."

SOUTHERN COAST AND VANCOUVER ISLAND INSPECTION DISTRICTS.

REPORT BY JAMES DICKSON, INSPECTOR.

I have the honour to submit my annual report as Inspector of Metalliferous Mines for above districts during year ended December 31st, 1925.

Britannia Mining and Smelting Co.

C. P. Browning, general manager; James I. Moore, superintendent; V. M. Brennan, assistant superintendent; John Sleeman, mine foreman. The mines operated by this company are situated near Howe sound, about 35 miles north of Vancouver, and are several miles inland. The bulk of the ore is transported between the main tunnel of the mine (2,200-foot level) and the mill, which is on tide-water, by means of electric-locomotive haulage; the difference in elevation is overcome partly by a 3-per-cent. grade on 3½ miles of haulage-track and the remainder by means of a 1,400-foot transfer-shaft into which the ore is discharged and reloaded on another electric haulage-train at the bottom. This lower tunnel is 4,000 feet long and the portal is a few hundred feet from the mill and at an elevation which permits the ore to be discharged into the storage-bins of the mill.

Part of the ore, principally from the *Victoria* mine, is transferred from the mine-cars about half a mile from the 2,200-foot portal and is carried from this point by means of an aerial tram which has its lower terminal at the mill.

In the *Fairview* part of the mine the extraction of the ore is mainly by the shrinkage system, with open "glory-hole" methods on the surface, while in the *Victoria* mine, where the ground is not so strong, all the stopes are timbered. A new shaft was started about a mile east of the *Victoria* mine and at the end of the year had reached a depth of 100 feet; there are forty men employed at this new part of the operation.

There are approximately 1,000 men employed in the various departments of the mine, mill, and transportation. There were two fatal accidents during the year and several of a serious nature.

The "Safety First" organization is a live force at this mine and no doubt is a factor in making operations as safe as possible.

Seventy-five per cent. of the underground employees are on a bonus system, which appears to be giving satisfaction to every one concerned.

During the year 682,000 tons of ore was broken, while the ore drawn amounted to 1,032,596 tons, the latter figure being a record for these mines.

The explosives used during the year amounted to 578 tons; this was composed of both gelatine and ammonia grades of 30 and 40 per cent.

Preparations are being made to install the Lily Safety Controller on all the hoists where men are handled.

When inspected during 1925 the various workings were found to be well ventilated and timbered and the officials carrying out their duties in accordance with the "Metalliferous Mines Regulation Act."

Doratha Morton.

This property is situated at Fanny bay, on Phillips arm, and was reopened during 1925 by the Glasair Mining Corporation, Limited. The work done underground consisted of cleaning up the tunnels and roadways in preparation for mining. The property is about 2½ miles from tide-water, at an elevation of 1,700 to 1,900 feet, and found to be in a safe condition.

During inspection in October the main work being done was the building of an aerial tram from the mines to the shore. There were ten men employed at this time.

Lenora.

R. G. Mellin, superintendent and lessee. During the year some work was done in the old tunnel of this property with the intention of recovering the ore left from the previous operations. Several men were intermittently employed during the early part of the year; the principal work being done on broken ground a few feet within the portal. At this property safe working conditions prevail.

Phair.

This property, which had been abandoned for a number of years, was reopened during the year by S. P. Moody and associates and a small crew of men employed in cleaning up the old tunnels. Operations were carried out under safe conditions.

NICOLA-PRINCETON INSPECTION DISTRICT.

REPORT BY JOHN G. BIGGS, INSPECTOR.

I have the honour to submit my annual report as Inspector of the Metalliferous Mines operating in the Nicola-Princeton Inspection District for the year ended 1925.

Windpass. Ben N. Sharp, superintendent. This property, which is at an elevation of 5,400 feet, is situated about 8 miles from Chu Chua, a small settlement on the Canadian National Railway 60 miles from Kamloops, and is accessible by a good wagon-road leading to the foot of the mountain; thence by a trail winding around the side of the mountain for a distance of about 3 miles. All the material used at the mine is carried from the flats below by means of pack-horses.

The work at present being done is for the purpose of proving the extent of ore-bodies and the development of the mine. The ore mined is stored near the entrance to the mine until means of transportation to the foot of the mountain are available.

The property has been in the development stage for a number of years and a fairly large amount of work has been done on a vein, the chief values of which are in gold, from a level driven into the side of the mountain, a distance of about 900 feet, with raises driven to the surface and winzes to the dip and a considerable amount of crosscutting. The vein has a clean-cut cleavage with the walls which are of an extremely firm and hard nature, with the result that little timber is required in the mine.

The plant is small and of a temporary character and consists of a 25-horse-power semi-Diesel engine used for driving a belt-driven single-stage 8 by 9 air-compressor, which supplies power for driving a Denver rock-drill, small tugger hoist, and a small pump. When last inspected nine men were employed underground, the mine operating two shifts. General conditions in and around the mine were very good. The cook-house and bunk-house are kept in good condition and in respect to sanitation and cleanliness are faultless.

Kamloops Copper. A. E. Wallinder, superintendent. This company was reorganized during the present year and is operating on a group of claims situated about 7 miles south-west of the city of Kamloops. The most important developments have been done at the *Iron Mask*, where the main plant and the mill are situated. The working-shaft at this point follows the ore-body a vertical distance of about 750 feet to the lower level, which is connected to the *Erin* shaft, situated about 700 feet east of the *Iron Mask*, thereby providing means of ventilating for these operations.

Work done during the present year has been of an exploratory nature, with the object of proving the main ore-body in this mineral-zone. During the early part of the year work was commenced on a new double-compartment 4- by 7-foot vertical shaft at a point about 2,000 feet south-west of the *Iron Mask*. This shaft was sunk to a depth of 210 feet and is well timbered with 10 by 10 square sills and 2-inch casings. At the foot of the shaft a level is being driven towards the *Iron Mask* to connect with a level which is being driven to meet it from the 750 station in that shaft.

The present roads driven are of small sectional area, the ground is firm and well cleaned down, and very little timber is necessary in this mine. The ventilation of the workings is satisfactory.

Electric power is transmitted from the city of Kamloops at a voltage of 11,000 and is transformed to 440 and 100 volts for use at this mine.

During inspections it is observed the provisions of the "Metalliferous Mines Regulation Act" are well adhered to and every endeavour made to care for the safety of the employees.

Good accommodation is provided for the workmen, while the cook-house, bunk-house, and wash-rooms are in a good and sanitary condition.

Enterprise. Thomas Corwin, superintendent. This property is situated at Stump lake, 30 miles from Merritt, and is accessible by a good road branching off to the north from the Merritt–Kamloops highway, which is a distance of about 2 miles from this property. The *Enterprise*, which was formerly known as the *Star*, along with the *Planet No. 1* and the *Silver King*, had been acquired during the present year by the Planet Mines and Reduction Company, of Nicola, and work done during the year was with the object of getting the plant into shape to ship ore. This work consisted of the building and repairing of

roads, erection of the camp buildings, the installation of a small power plant, and the dewatering of the *Enterprise* and the *Planet* shafts.

Work is being concentrated on the *Enterprise*, where some development-work was done many years ago, by way of sinking and drifting on a silver-lead vein. The shaft follows the ore-body, which lies at an angle of 65°, dipping into the side of the mountain, and has been driven a distance of 100 feet, with some drifting on each side of the slope. During the latter part of the year a 25-horse-power semi-distillate-gas engine coupled to a belt-driven single-stage air-compressor, having a capacity of 125 feet of free air a minute, was installed near the entrance to the mine. This installation will furnish power for use in the mine and for driving a small hoist situated at the surface.

When this property was last visited, during the month of November, a very commodious cook-house and dining-house had been completed and a number of employees were engaged in the erection of bunk-houses, which upon being completed will provide good accommodation for the employees. During the month of December the company commenced mining operations by drifting on the south 50-foot level and at the end of the year had mined about 150 tons, 40 tons of which had been taken by trucks to Nicola for shipment to the Trail smelter. There are ten men employed, four of whom are employed underground.

Pioneer. David Sloan, superintendent. This property is situated 50 miles north of Shalalth, a small settlement situated on the Pacific Great Eastern Railway and 15 miles west of the town of Lillooet, at the entrance to the Bridge River district, and is accessible by a fairly good wagon-road from the railway. The property has been operated intermittently for a number of years and is at present operated under bond by the present company.

The operations consist of a 5 by 10 shaft timbered with 8 by 8 square sets sunk from the side of the hill, following the vein at an angle of 75° to what is known as the 100-foot level, where it is intersected by level driven from the side of the hill. From this point the shaft follows the vein, which is dipping at an angle of 85°, to the 300-foot level, at which point the dip of the vein changes to an angle of 75°. The shaft leaves the vein at this point and is continued at the 85° pitch to what is known as the 450-foot level, but which I am informed is actually 406 feet from the surface. It is at this point where the present mining operations are being conducted.

This shaft is divided into two compartments, one side being provided with a ladder-way lying at a suitable inclination, with the necessary platforms at intervals of 20 feet, and is used as a manway; the other portion of the shaft is used for operating a skip, having a capacity of about 1,200 lb., which is loaded from an ore-pocket below the floor of the lower level. The skip is provided with small wheels running on 16-lb. rails secured to the shaft sets and fish-plated at the joints; above the wheels wooden guides are installed which prevent the wheels of the skip leaving the track. A 6 by 8 Jencks air-hoist fitted with a ¾-inch crucible-steel cable is used for hoisting purposes in this shaft. The hoisting-speed is about 2 miles an hour.

Water-power direct is used for operating the mill, and for generating power for use in the mine and on the surface a dam has been placed in the Cadwaller creek, about half a mile above the mill-site, at a head of about 30 feet. The water is conducted by a flume winding along the side of the hill and upon reaching the mine operates a water-turbine which is coupled to the mill machinery, two 12 by 12 air-compressors, and an electric generator which is used for lighting the camp buildings and the mine. These operations are small and all work done is in close proximity to the shaft.

During the last visit of inspection nine men were employed below ground and the mine operating two shifts. The conditions around the camp were very satisfactory for operations of this description. The shaft-casing and the partition required some attention and the shaft required cleaning. This, the management advised, would receive immediate attention.

Copper Mountain. Operated by the Allenby Copper Company, Limited; John McLaughlin, superintendent. This property is situated in the Similkameen Mining Division, 12 miles from the town of Princeton. The mine is well developed and capable of producing a large tonnage of ore, but has not been operated for a number of years. Operations were resumed during the month of August.

This mine has been developed by three large and well-maintained levels driven from the side of the mountain to the ore-bodies. These are known as the No. 1 level, situated at an elevation of 4,073 feet and 500 feet in length; No. 2 level, elevation 3,945 feet, driven in a distance of

2,500 feet; No. 3 or lower tunnel, elevation 3,170 feet, driven in a distance of 3,000 feet. A vertical shaft known as the "Sunset," the entrance of which is a little above the elevation of the No. 2 tunnel, has been sunk to No. 3 level, a distance of 860 feet; there is also a spiral chute from the No. 2 level to the No. 3 level. An incline tramway has been built connecting No. 3 and No. 2 levels.

The No. 2 level, situated at the same elevation as the camp-site, is used as the main working-level; from this branch levels have been driven off, from which stopes have been driven to the surface. Mining operations on the surface are now being carried on by the open-cutting or "glory-hole" system.

Mine-cars having a capacity of about 7 tons are loaded at the different chutes on the No. 2 level and gathered by 7-ton Baldwin-Westinghouse electric-trolley locomotives, and hauled in trips to the main spiral chute connecting No. 2 and No. 3 levels, where the cars are automatically dumped, the ore passing down the spiral chute to where it is again loaded into cars and hauled to trips by electric locomotives to the crusher-bin situated at the surface. Electric power is supplied by the West Kootenay Power Company and is transmitted a distance of 230 miles at 60,000 volts to the sub-station near the mine, where it is transformed to 2,200, 550, and 110 volts for use in and about the mine.

The chief power used underground is compressed air and the plant consists of one Rand duplex cross-compound compressor with a capacity of 3,000 cubic feet a minute, rope-driven by a 2,200-volt 600-horse-power motor; one Rand duplex compound compressor with a capacity of 2,500 cubic feet a minute, rope-driven by a 2,200-volt 400-horse-power motor; one Rand cross-compound compressor with a capacity of 1,000 cubic feet a minute, belt-driven by a 2,200-volt 150-horse-power motor. The only compressor used at present is the one producing 2,500 feet of air a minute, which is found to be sufficient for present purposes. A 14 by 20 Jencks geared hoist is installed at the shaft for hoisting. Two 150-kw. motor regenerator sets provide electric power at 250 volts d.c. for haulage purposes. A 3-throw pumping plant situated at the river, pumping against a head of 1,700 feet and driven by a 100-horse-power motor, provides an ample supply of water for the camp.

The "block" system of signalling is used on all the main roads of this mine. Chute platforms and all dangerous openings are fenced; blasting-signals by means of a whistle have been installed at the upper workings of "glory-holes," which warn men in the vicinity when blasting is about to take place. The various stope-walls are scaled regularly by men employed for this purpose and all visible loose ground is barred down.

The storage of explosives, of which there is a considerable amount used, is well looked after. A new magazine built with concrete and fire-proof material is situated some distance away from the entrance to the No. 3 level and is well clear of the operations. This magazine is built to replace a wooden structure.

A special building, steam-heated and furnished with necessary apparatus and material and under the supervision of a first-aid man, is provided in connection with first-aid work at the mine. There is also provided a well-maintained mess-house having a seating capacity for about 300 men, a fine bunk-house, and a large steam-heated wash-house fitted with shower-baths, wash-basins, toilets, and lockers. The mine is well provided with an up-to-date machine-shop, a carpenter-shop, offices, and a number of cottages with modern conveniences. A good water system for protection against fire is provided and several hydrants are placed at various points around the works.

During visits to this mine it is found the requirements of the "Metalliferous Mines Regulation Act" are well adhered to.

Nickel Plate.

G. P. Jones, general manager; Wallace Knowles, superintendent. This mine is situated on the Nickel Plate mountain, in the Osoyoos Mining Division, and accessible from the town of Hedley, where the mill and the major portion of the plant is situated. The entrance to the mine is at an elevation of 5,500 feet and 3,800 feet above the town of Hedley, which is situated about 3 miles away at the foot of the mountain. The mine is developed by a well-maintained level 900 feet in length, from which a 30° double-track slope is driven a distance of about 1,400 feet. The ore is found in lenticular bodies in the form of arsenical iron, with an andesite gangue of a very hard and firm nature, and as a result very little timber is used in these operations.

The method of work adopted is underhand stoping, or working from the roof of the ore-body downwards, the roof being well barred down and cleaned in the early stages of the mining before the lower part of the vein-matter is removed. The ore is loaded in small cars at the foot of the chute and trammed by hand to the ore-pockets, situated immediately above the slope. It is drawn from the pockets as required into 2-ton skips and hoisted by a double-drum air-hoist to the top of the slope and dumped into a large ore-bin, from which it is loaded into a train of cars and hauled by electric-trolley locomotive to the top of a surface incline, where it is again dumped into an ore-bin and drawn off in 5-ton skips and taken to the mill at Hedley over a gravity-plane incline worked in two sections.

Sixty-per-cent. Polar Forcite is the explosive used for blasting. All shots are fired by detonating-caps and fuse on the afternoon shift, immediately before the workmen leave the mine. During inspections it is found the provisions of the "Metalliferous Mines Regulation Act" are well adhered to. Good accommodations are provided for the workmen.

During 1925 a vigorous policy of drilling on the surface was carried out in an effort to determine the location and size of ore-bodies adjacent to the present operations.

A 2,000-horse-power hydro-electric power plant situated on the Similkameen river, a little below the town of Hedley, is used for providing power for this operation, but unfortunately, owing to the unusual dry summer and fall, the flow of water in the river was small and totally inadequate for power purposes for this operation. The auxiliary steam plant situated near the mill, consisting of three return-tubular boilers and a Goldie-Corliss engine, coupled direct to a 375-kw. generator, was brought into commission and used for several weeks, but evidently was not satisfactory as operations were suspended on November 24th with the intention of resuming operations during the early spring of 1926.

Aberdeen. Operated by the Merritt Mines, Limited; R. D. Watson, superintendent. This property is situated on 10-Mile creek, about 10 miles from the town of Nicola. The working consists of a vertical 6 by 12 shaft timbered with stulls and square sets and sunk to a depth of 200 feet from the surface. A separate manway, a short distance to the east of the main shaft, has been provided with the necessary ladders and platforms. The mine has not operated for a number of years, but during the early part of 1925 was bonded by the above-named company and the water taken out. Mining operations were then commenced and a small number of men employed. The 150-foot east level has been extended and the ore taken out and shipped by wagons to an ore-bunker situated at the side of the Kettle Valley Railway, near the town of Nicola.

When last inspected six men were employed underground and six on the surface. The conditions of the mine were good and the "Metalliferous Mines Regulation Act" complied with. The sanitary conditions in and around the mine are excellent and good accommodation is provided for the employees.

The power plant consists of a 25-horse-power locomotive-type boiler, small winding steam-engine, and a 3-drill compressor; the latter is not being used at present.

Vimy Ridge. This property is situated near Guichon creek, 14 miles from Nicola and 1½ miles west of the *Aberdeen* property. It is operated by the Merritt Mines, Limited, and is reached by a good wagon-road which has been constructed during the present year from the *Aberdeen* to the *Vimy Ridge*. There was a small shaft sunk on this property several years ago from the side of the hill and connected to a level which was entered by and driven in from the foot of the hill, a distance of 80 feet. This shaft has been widened to 6 by 10 feet inside the timbers. It is well timbered with framed sets and stulls and extended to a depth of 175 feet, also provided with a ladder-way and platforms. Some drifting has been done from the foot of the shaft. A new head-frame has been erected. The power plant consists of a 10-horse-power Fairbanks gasolene-engine used for hoisting. Hand-steel is used by the miners for drilling and 40-per-cent. Forcite explosive used for blasting.

The conditions around the mine are very good and the provisions of the "Metalliferous Mines Regulation Act" complied with. During the year commodious cook and bunk houses were erected, which provide good accommodation for the employees.

WEST KOOTENAY AND BOUNDARY DISTRICTS.

REPORT BY H. H. JOHNSTONE, INSPECTOR.

I have the honour to submit my annual report as Inspector of Metalliferous Mines for West Kootenay and Boundary Districts for the year 1925.

During the year forty-four different properties were inspected and 165 visits of inspection were made.

The year has seen a renewed interest in mining, as evidenced by the opening-up of new properties and the new lease of life taken by several old properties that had been looked upon as being past the productive stage.

TRAIL CREEK MINING DIVISION.

In the Rossland district operations by the Consolidated Mining, Smelting, and Power Company, Limited, were considerably curtailed, as evidenced by the number of men employed. In January they had a force of 320 men on their different properties in the camp. This force gradually dwindled as they swung from production to development, until in December only 105 men were employed.

The free-gold belt on O.K. mountain was fairly active during the whole year, small forces of leasers working on the different properties. The *Velvet-Portland*, owned and operated by a local syndicate, worked throughout the year. Their operations consisted of the driving of a long tunnel for the draining of the shaft, which was successful, as evidenced by the fact that the mine is now so dry that water for drilling purposes has to be sent down. This property promises to be added to the list of shippers in the near future. Conditions are good in and around the mines in this district and the requirements of the "Metalliferous Mines Regulation Act" are well adhered to.

NELSON MINING DIVISION.

Numerous new properties are under development with small forces of men. In the Sheep Creek district work has been continuous on the *Emerald*, which was a steady shipper during the early months of the year, but lately has been working on a development scheme. The *H.B.*, which was a large producer of zinc during the war, has been reopened by the Victoria Syndicate and development is proceeding under capable management. The Ymir district has seen the reopening of the *Hunter V.* by the Consolidated Mining, Smelting, and Power Company and other properties are in process of development. Conditions are good in and around these properties and the requirements of the "Metalliferous Mines Regulation Act" well adhered to.

AINSWORTH MINING DIVISION.

The *Bluebell* has re-entered the shipping class and the *Whitewater Deep* has resumed operations with a large development scheme. The *Cork-Province* has been operating during the greater part of the year. The *United* has been worked spasmodically and it is understood that the owners will continue work in the spring. The *Leviathan*, on Campbell creek, was under development by a Victoria syndicate for some months, but operations have been discontinued and the plant moved to the *H.B.*, in the Sheep Creek district. The *Highland* has been a steady shipper, operated by the Consolidated Mining and Smelting Company. The *Kirby* at Riondel has worked on development throughout the year and is expected soon to enter the shipping-list. Numerous other properties are under lease and development. Conditions at the different properties are good and the "Metalliferous Mines Regulation Act" well adhered to.

SLOCAN MINING DIVISION.

There has been a great amount of activity and resumption of work on several old properties. The *Slocan Star* group, operated by the Silversmith Mines, Limited, has been the largest shipper from this district. The *Ruth-Hope* is the next largest employer of labour in this district and promises to be one of the large shippers during the coming year. Work has again been started on the old *Noonday* under the Silversmith Mines management. The Victoria Syndicate has a small crew working on both the *Carnation* and *Minnehaha*. The *Wonderful* has been worked by C. Cunningham for practically the whole year. The *McAllister*, after installing a tramway,

has resumed mining operations and joined the shipping-list. The *American Boy* has operated throughout the year with a small force, part of the time on company account and the balance on contract-work. The *Molly Hughes*, after operating for part of the year, was compelled to close down through legal troubles. The *Bosun* has worked continuously throughout the year and has been a steady shipper. The *Standard* has been worked by leasers and has shipped considerable concentrates. The *Galena Farm*, after being operated by leasers, has been taken over by a strong company and quite an extensive programme of development has been decided upon. The *Van-Roi* was worked by the owner, C. Cunningham, for the greater part of the year, but lately nothing has been done except development-work. The *Hewitt* and *Lucky Thought* have been worked by leasers. The *Lucky Jim* has had a good operating force at work and has been a large shipper of concentrates and crude ore. Numerous other properties are under lease and development. Conditions around these properties are good and the "Metalliferous Mines Regulation Act" well adhered to.

TROUT LAKE, LARDEAU, AND REVELSTOKE MINING DIVISIONS.

In the above-named Divisions conditions have improved somewhat. The *True Fissure* operated throughout the year. The *Mohican*, on Gainer creek, put a crew to work in July and will continue work during the winter. The *Cromwell*, on Brown's creek, is working this winter under contract. The Wigwam Mining Company is operating a property on Isaac creek. During the summer months activities were confined to surface work, putting up buildings, and installing a plant. Advice has been received from the manager that they are now operating underground.

GREENWOOD MINING DIVISION.

This Division has seen quite a lot of increased activity, especially in the Beaverdell section. The *Bell*, operated formerly by McIntosh and Crane, but at present by McIntosh and Lee, was worked continuously and has been a steady producer. The *Sally* group, formerly operated by the Wallace Mountain Mines, Limited, and later by the Federal Mining and Smelting Company, has been the largest shipper from this district. This company is also developing the *Bounty* and *Tiger* groups on Wallace mountain. The *Rambler* and *Revenge* groups have operated steadily and numerous other properties are developing. The *Providence* at Greenwood was operated till lightning destroyed the headworks and compressor plant. The *Elkhorn Fraction*, joining the *Providence*, was operated under lease and bond by local parties. These in turn disposed of the property to a Victoria company, which is now operating it. The *Combination*, *Spotted Horse*, and several other properties have been worked in a small way. At Grand Forks the *Rock Candy* was worked for a few months by the Consolidated Mining and Smelting Company. General conditions are good and the requirements of the "Metalliferous Mines Regulation Act" well adhered to.

One fatal accident and one of a serious nature occurred during the year.

The managements of the different properties have, with but few exceptions, been desirous of co-operating in all endeavours to make the mines more safe and working conditions more pleasant. Many suggestions have been received and, as far as possible, acted upon. Such suggestions have been appreciated and it is hoped for a continuance of cordial relations.

EAST KOOTENAY, WEST KOOTENAY, AND BOUNDARY INSPECTION DISTRICTS.

REPORT BY ROBERT STRACHAN, SENIOR INSPECTOR.

I have the honour to submit the annual report covering the inspection of mines as provided for in the "Metalliferous Mines Regulation Act" during the year 1925 in the Kootenay-Boundary District.

For the purposes of inspection the district is divided into the West Kootenay and Boundary and East Kootenay; the former with H. H. Johnstone in charge, with office in Nelson; the latter with John MacDonld in charge, with office in Fernie. The Senior Inspector acts as supervising Inspector for the two districts.

WEST KOOTENAY AND BOUNDARY DISTRICT.

While the largest mines in this district, situated at Rossland, have curtailed operations to a great extent, many small mines previously abandoned have been reopened, and while there are over 200 men less employed at Rossland, the number of men employed in the whole district shows an increase of about thirty-seven.

TRAIL DISTRICT.

The largest mines still operating in this district are the Rossland mines, including the *Le Roi*, *Josie*, *White Bear*, *War Eagle*, and *Centre Star*, owned by the Consolidated Mining and Smelting Company of Canada, with F. S. Peters as local superintendent and Wm. M. Archibald as manager for all the company's mines.

After a prolonged campaign of prospecting and drilling this company decided to at least temporarily abandon productive mining and concentrate on prospecting by drifting and diamond-drilling in selected portions of the mine. This decision is reflected in our inspection reports, which shows the number of employees for the month of January as 320, whereas in December only 105 were employed.

Rossland mines, with their past great production of gold and copper ores, figured greatly in the mineral development of the Province, and it is sincerely hoped that the latest efforts will be handsomely rewarded.

Conditions at the time of inspections have generally been found very good, both with respect to safety and health. Very good change accommodation is maintained for the use of the workmen, but no bunk or cook houses as practically all the workmen reside in their own homes in Rossland.

Close to Rossland active work has been carried out on many small properties, mostly mining free gold, of which the *I.X.L.*, the *O.K.*, and the *Midnight* came under our inspection. Conditions at these mines were found very good, while, like the Rossland mines, most of the workmen reside in the town.

The *Velvet-Portland*, owned and operated by a local syndicate under the name of the Rossland Velvet Mining Company, worked steadily all year, driving a long tunnel to reach the ore-body and cut off the vertical shaft previously used, besides affording economic drainage. The ores in the *Velvet-Portland* are gold and copper and this mine is expected to ship ore early in the year 1926. The work is under N. Michaely as superintendent and the conditions have always been found to be very good with respect to safety and health, both in the mine and in the accommodation provided for the workmen.

No accident of any kind was reported from this district during the year and reflects the good discipline maintained and compliance with the regulations provided for the mines.

NELSON DISTRICT.

In this district the only mines in active operation during the year were in the Salmo and Ymir districts.

The *Emerald* worked steadily all year, while towards the latter part the *H.B.* and *Hunter V.* resumed operations. The total force employed at these three mines would amount to about fifty men.

These operations are on a small scale and generally the conditions with respect to bunk-house, cook-house, and change-rooms were found very good and every attempt made to reasonably comply with the "Metalliferous Mines Regulation Act."

KOOTENAY LAKE DISTRICT.

In this district the *Bluebell* and the *Kirby*, both at *Riondel*, operated during the year, the latter principally on development-work.

At the *Bluebell* work was very steady during the year with a fairly large force of men, but towards the latter end of the year the lack of water for power interfered with their operations. This mine is now being operated by Messrs. Eastman and Fowler, with the former as superintendent and Charles Sherwin as mine foreman.

At Ainsworth the *Highland*, operated by the Consolidated Mining and Smelting Company of Canada, under L. W. Oughtred as superintendent, worked steadily all year and the *United* for a part of the year.

At Kaslo the *Cork-Province* operated with a small force during the year; also the *Lucky Jim*, the *Whitewater*, and the *Leviathan*. Operations at the latter property ceased towards the end of 1925 and the plant was moved to another mine.

At all these mines during the inspection conditions were found fairly good with respect to health and safety, bunk-house, cook-house, and change-rooms.

SLOCAN DISTRICT.

In this district the principal mine working during the year was the *Slocan Star*, operated by the Silversmith Mines, Limited, at Sandon. In and around the mine an average force of over eighty men were employed, with O. V. White as manager.

The next largest was the *Ruth-Hope*, operated by the Ruth-Hope Mining Company, with R. H. Stewart as manager and John Hanna as superintendent, which worked steadily all year with a force of about forty men. In addition to these, small forces of men were employed on the following: *Carnation*, *American Boy*, *Minnichaha*, and the *Wonderful*.

At New Denver the *Bosun*, operated by the Rosebery-Surprise Mining Company, with J. P. MacFadden as superintendent, worked steadily all the year, a portion of the mine by the company and several small sections by leasers.

The *Molly Hughes*, also at New Denver, was operated in the early part of the year, but discontinued towards the latter end.

At Silverton the *Standard*, owned by the Standard Silver-Lead Mining Company, was operated by some leasers during the year, while small forces, mostly leasers, were working in the *Golden Age*, the *Hewitt*, and the *Galena Farm*.

The *Van Roi* was operated on a small scale during the year by Clarance Cunninghame.

Towards the latter end of the year the *Galena Farm* was taken over by the Porcupine Finance and Development Company and a considerable amount of prospecting and development work is and will be done for some time.

The conditions in and around the majority of these mines were found at the time of inspection to be fairly good, both with respect to safety and health and the compliance with the "Metalliferous Mines Regulation Act."

In one of the mines it was found necessary to prosecute for failure to comply with the regulations.

BOUNDARY DISTRICT.

In this district the principal operations were in and around Beaverdell and on Wallace mountain.

The *Sally*, owned by the Wallace Mountain Mines, Limited, was the largest operator, employing a force of about thirty men. During the year this mine was optioned by the Federal Mining and Smelting Company.

The *Bell*, owned by Messrs. McIntosh and Crane, also operated steadily during the year with a force of about twenty men. A change later took place in the ownership in this mine, Mr. Crane retiring and his interest being acquired by Henry Lee, former manager for the *Sally* under the Federal Mining Company. The *Rambler* was also worked during the entire year under the supervision of Mr. Carpenter, three tunnels being driven. A new property has been opened up in this district during the year in the *Beaver*, with Roy Clothier in charge, close to the *Bell*, and gives promise of turning out well. In addition to these, several other small properties are either being opened up or reopened.

At Greenwood the *Providence* operated in the early part of the year, but owing to a fire destroying the plant no active mining was done after January. The *Elkhorn Fraction*, adjoining the *Providence*, was worked on a small scale by D. McGillis and partners, they having taken an option from Mr. McKenzie, the owner, with very encouraging results. The *Combination*, *Spotted Horse*, and the *D.A.* were also active in a small way during the year and give promise of greater things in the near future.

At all the mines in the Boundary district conditions were found fairly good at the time of inspections. At the larger mines bunk-houses, cook-houses, and change-rooms are maintained in a fairly good condition, while at the smaller properties most of the workmen change and live at home. Safety and health conditions were fairly well maintained in and around the mines and the "Metalliferous Mines Regulation Act" fairly well complied with.

In the Grand Forks district the *Rock Candy*, which is a fluorspar producer, was reopened after being closed down for some time and a force of about fifty men employed. The fluorspar is shipped to Trail smelter, where it is used for the production of hydrofluoric acid, which is used in the lead-refinery. The mine is owned by the Consolidated Mining and Smelting Company of Canada. D. Matheson is superintendent. With regard to safety and health conditions at this mine, conditions have been very good and the "Metalliferous Mines Regulation Act" very well complied with.

EAST KOOTENAY DISTRICT.

In this district four mines came under inspection during the year—the *Sullivan*, which is dealt with as two mines, the Upper district and the Tunnel district, although both are working on the same series of ore-bodies; both owned by the same company and come under the same management. Each of these portions have a separate mine foreman and, owing to different gauges of track, separate installations. The huge size of the mine makes it more convenient to regard each district as a separate mine.

The *Stemwinder*, which was reopened last year, is situated on Mark creek, about a mile farther up and on the other side from the *Sullivan*. The *Paradise*, situated about 20 miles from Invermere, is in the Windermere district.

The *Sullivan* mine is owned and operated by the Consolidated Mining and Smelting Company of Canada, with E. G. Montgomery as local superintendent and M. O'Brien as assistant superintendent. The mine worked steadily all year and the production of ore, lead, zinc, and silver will run well over the 1,000,000-ton mark. Previous reports, both by the Inspection Department and the Resident Mining Engineer, A. G. Langley, have given very good descriptions of the plant and equipment at this mine and for further reference these reports can be consulted. Constant additions are being made with a view to maintaining the large production, as well as to provide for a future increase. In the upper workings during the year methods of stoping and haulage proved successful in the tunnel, or newer operations have been adopted with modifications to suit local requirements. These include the laying-out of the stopes at a greater angle, dispensing with ladder-ways and chutes, the use of scrapers or conveyors for delivering the ore convenient to loading, and the introduction of small storage-battery locomotives for handling the mine-cars.

The hoists for handling the scrapers or conveyors are well worth the attention of all mining operators, having been specially designed for compactness and having every moving part carefully covered, and can be regarded as an ideal type to be adopted as a standard for mine hoists. Inside the mine it is impossible to overlook the fact that every attempt is made to maintain a very high standard of both safety and health, and along these lines the efforts of all the officials are devoted and every encouragement and attention given to suggestions from employees for greater safety.

With the increased operations, the requirements for greater change-room accommodation, offices, living and eating accommodation for the employees have been fairly well met, without in the least way sacrificing the high standards previously set. For the married employees many new homes have been built, until the McDougal townsite is becoming quite a town in itself. These homes have all been well laid out on streets, boulevards with trees planted along each side, and contribute to a great extent to the pleasant relations which exist between the employees and the company.

No new additions have been made to the power-house during the year, the present power being obtained from the East Kootenay Power Company, with plants at Bull river and Elko, well over 2,000 horse-power being used in the plant. Five compressors with a combined capacity of 16,500 cubic feet of free air a minute are housed in the compressor-room. Additions have been made to the storage-bins at the rock-house, making it almost 100 feet longer, to cope with the expected increased production early in 1926. In addition to the power obtained from the East Kootenay Power Company, a steam plant of over 500-horse-power capacity is maintained as an auxiliary.

During inspections it was found the conditions both with respect to safety and health were maintained at a very high standard, and considering the magnitude of the operations it is very gratifying to be able to record that the endeavours of all the officials seem to be to comply with the "Metalliferous Mines Regulation Act" and every suggestion tending to greater safety.

At the *Stemwinder*, operated by the Porcupine Goldfields Development and Finance Company, with Chas. Starr as superintendent, conditions have generally been found very good.

No bunk-house or cook-house is maintained, practically all the workmen residing in their own homes at Kimberley, and the accommodation for changing is fairly good.

The principal work during the year has been sinking and drifting, while an extensive programme of drilling has been entered on at the latter part of the year. Similar to the *Sullivan*, power for operations is secured from the East Kootenay Power Company, and at present an air-compressor, electrically operated, provides power for hoisting, pumping, and drilling.

This mine is situated about a mile farther up and on the opposite side of Mark creek from the *Sullivan*.

The *Paradise* mine, owned and operated by Robert Randolph Bruce, with Robert MacDonald as superintendent, is situated about 20 miles from Invermere. It is situated in the Paradise basin and is reached by a wagon-road following Toby and Spring creeks.

The ore, silver and lead in the form of carbonates mostly, is hauled by auto-trucks in summer and sleighs in winter to a loading-station at Invermere, on the Kootenay Central Railway, for shipment to Trail smelter.

The general conditions in and around this mine we found very good, health and safety being well looked after. Practically all the workmen at this mine, situated well up in the mountains, numbering about thirty, reside in the bunk-house and both this and the cook-house are maintained up to a very high standard.

The number of workmen engaged in and around the metalliferous mines which have come under inspection during the year is shown in the following table:—

District.	Underground.	Above Ground.	Total.
West Kootenay and Boundary	561	261	822
East Kootenay	466	366	832
Totals	1,027	627	1,654

INSPECTION.

In the larger mines an attempt is made to inspect these almost every month, in the smaller less frequently, but conditions existing frequently determine the number of visits of inspection. All serious accidents reported are generally causes of visits of inspection in addition to the regular inspection-work. During the year forty-eight mines were inspected and 205 visits of inspection made.

ACCIDENTS.

As provided for by section 19 of the "Metalliferous Mines Regulation Act," notice was received of fourteen accidents, involving injury or death to an equal number of workmen. All of these came under subsection (*b*) and no accidents were reported as resulting from explosions of either gas, explosives, or steam-boilers. This is a substantial reduction in accidents as compared with the previous year, in which twenty-six were reported.

Of the fourteen accidents, three proved fatal, as compared with five last year, and shows a death-rate per thousand employees for both above and under ground of 1.7, as compared with 3.5 for the previous year.

According to districts, twelve of these, including two of the fatal accidents, were in East Kootenay and all in or about the *Sullivan;* one proved fatal in the Slocan, at the *Bosun;* and the other, which was non-fatal, at the *Highland* mine at Ainsworth. The occupations are given as follows: Miners, 3; muckers or labourers, 8; rock-house boss, 1.

The causes are: Falling into chutes or ore-bins, 4; haulage, 5; injured through handling steel, 2; slipping on loose plank, 1; miscellaneous, 2.

Ten of these accidents occurred inside the mine and four outside. One of the fatal accidents occurred while preparing to repair a bulk-head which had been blasted on forty-eight hours previously; the bulk-head gave way. Another was owing to the workman falling into the storage

ore-bin receiving injuries from which he died twenty-one days later. Another was due to the workman falling down a manway which was not provided with platforms, as required by section 31, Rule 21, of the "Metalliferous Mines Regulation Act."

Two of the non-fatal accidents were due, first, to a piece of steel flying off the end of the drill while being driven into the hole and would indicate a better use of the facilities offered by the operating company to furnish goggles on request; the other through careless handling of the steel into a skip. Four due to falling into chutes or ore-bins shows the necessity of greater care in protecting chutes.

Accidents due to haulage were mostly outside, concerned with coupling and uncoupling of cars, although one, a serious case, was due to a workman walking towards a moving loaded car pushed by four workmen. The loaded car was not running at a speed exceeding 4 or 5 miles an hour; the two workmen walking towards the loaded car heard it coming, heard the men shouting, and even saw the approaching car, yet one failed to get clear and received injuries which necessitated the loss of his leg. There was lots of room on the sides to step off and the only conclusion arrived at is that the workmen delayed too long in getting off the track. No amount of supervision can prevent accidents of this class and appeal can only be made to the workmen to exercise more care and so assist the management in securing a reduction in the number of accidents.

In two out of three fatal accidents inquests were held, at both of which the Department was represented by the Inspector of Mines; in the other case, that of the workman dying twenty-one days after the accident, the Coroner decided that an inquest was unnecessary.

While the "Metalliferous Mines Regulation Act" makes no provision for notices of the time and place of inquest to be sent to the Inspector of Mines, similar to those provided in the "Coal-mines Regulation Act," the Coroners invariably do so, and the Inspector is much indebted to them for this privilege, as well as the opportunity given to examine witnesses in an endeavour to clear up the cause of the accident.

With respect to welfare-work, apart from the *Sullivan* very little attention is paid to this, but the demand for such work as first aid to the injured is just as great in small mines as in large ones. At many of these mines, situated far from medical aid, the provision in this respect is pitifully small. An instance of this came under notice at the accident in the *Highland*, Ainsworth, where not a single qualified first-aid man was employed and the nearest doctor at Kaslo. A serious accident occurred, and while the treatment accorded the injured party may have been fairly good, this was due more to accident than to training.

At the *Sullivan* classes in first aid to the injured and several other technical subjects are maintained every winter. The company provides the accommodation and the teachers and uses every inducement to encourage the employees to attend these. At the first-aid and mine-rescue meet held in Fernie on August 1st several of the officials from the *Sullivan* were present, including Mr. Montgomery, superintendent, and their interest displayed in the work of first aid gives hope to expect a representation from the *Sullivan* mine at the next annual meet of the East Kootenay Mine Safety Association.

PROSECUTIONS.

During the year it was found necessary to lay four charges against officials of the mines for failing to comply with the "Metalliferous Mines Regulation Act." To three of these charges a plea of guilty was tendered and the fourth charge was withdrawn at the request of the Magistrate.

Thanks are given to the workmen and officials in charge of the different mines for their assistance and co-operation during the year 1925, and look forward to a continuation of the same in the year 1926, realizing that it is only with their co-operation that the list of accidents, both fatal and non-fatal, can be reduced and kept to its lowest.

REPORTS OF COAL-MINE INSPECTORS.

The coal-mines of the Province are situated in four Inspection Districts—namely, Vancouver Island, Northern, Nicola-Princeton, and East Kootenay Districts.

VANCOUVER ISLAND INSPECTION DISTRICT.

THOS. R. JACKSON AND HENRY DEVLIN, INSPECTORS (HEADQUARTERS, NANAIMO).

James Dickson and Harry E. Miard, Inspectors, have assisted in the inspection of the coal-mines in this district during the year.

The Canadian Collieries (Dunsmuir), Limited, operated Nos. 4, 5, and 6 mines, Comox Colliery, and Nos. 1, 2, 3, 5, 6, and 7 mines, Wellington Extension Colliery.

The Western Fuel Corporation of Canada, Limited, operated No. 1 Reserve and Wakesiah mines, Nanaimo Colliery.

The Granby Consolidated Mining, Smelting, and Power Company, Limited, operated No. 1 mine, Granby Colliery, Cassidy.

The Nanoose-Wellington Coal Company, Limited, operated the Lantzville mine at Lantzville.

The East Wellington Coal Company, Limited, operated the No. 1 mine, East Wellington.

King and Foster (Island Collieries) operated Nos. 2, 5, 6, and 7 mines at Wellington.

The West Coast Collieries, Limited, Morden and Suquash Collieries, did not operate during the year.

NORTHERN INSPECTION DISTRICT.

T. J. SHENTON, INSPECTOR (HEADQUARTERS, PRINCE RUPERT).

The Telkwa Collieries operated the Goat River coal-mine.

NICOLA-PRINCETON INSPECTION DISTRICT.

JOHN G. BIGGS, INSPECTOR (HEADQUARTERS, MERRITT).

The Middlesboro Collieries, Limited, operated Nos. 4, 4 East, 5 East, and 5 South mines, Middlesboro Colliery, Merritt.

The Keystone Coal Company operated a pair of slopes in the No. 5 seam.

The Coalmont Collieries, Limited, operated Nos. 3 and 4 mines, Coalmont Colliery, Blakeburn.

The Princeton-B.C. Colliery Company, Limited, operated the new shaft mine at Princeton.

The Tulameen Valley Coal Mine Company operated its No. 1 mine.

The Sunshine Coal Company did a little work and made a small shipment from its mine near Merritt.

The Chu Chua, Wigan Collieries, and Hat Creek mines did not operate during the year.

EAST KOOTENAY INSPECTION DISTRICT.

ROBERT STRACHAN, SENIOR INSPECTOR, AND JOHN MACDONALD, INSPECTOR (HEADQUARTERS, FERNIE).

The Crow's Nest Pass Coal Company, Limited, operated No. 1 East, No. 2, No. 3, No. 1 South, and No. 9 mines, Coal Creek Colliery, and No. 3, No. 3 East, and No. 8 mines, Michel Colliery.

The Corbin Coals, Limited, operated Nos. 4, 5, and 6 mines, Corbin Colliery.

VANCOUVER ISLAND INSPECTION DISTRICT.

REPORTS BY THOS. R. JACKSON, JAMES DICKSON, AND HARRY E. MIARD, INSPECTORS.

Western Fuel Corporation of Canada, Ltd.

Head Office—Nanaimo, B.C.

H. J. McClung, President, Flagstaff, Arizona; G. W. Bowen, Vice-President, Nanaimo, B.C.; Mark Bate, Jr., Secretary-Treasurer, Nanaimo, B.C.; John Hunt, General Manager, Nanaimo, B.C.

The above company operated during 1925 the Nanaimo Colliery, which consists of No. 1 Reserve and Wakesiah mines, all situated in the vicinity of the city of Nanaimo.

The following returns show the combined output of all the mines of the Nanaimo Colliery:—

AGGREGATE RETURNS FROM THE WESTERN FUEL CORPORATION'S MINES FOR YEAR 1925.

SALES AND OUTPUT FOR YEAR.	COAL.		COKE.	
(Tons of 2,240 lb.)	Tons.	Tons.	Tons.	Tons.
Sold for consumption in Canada	319,385			
" export to United States	61,315			
" other countries				
Total sales		452,700		
Lost in washing	26,646			
Used in making coke				
" under colliery boilers, etc.	69,025			
Total for colliery use		95,671		
		548,371		
Stocks on hand first of year	11,243			
" last of year	31,932			
Difference added to stock during year		20,689		
Output of collieries for year		596,060		

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, ETC.

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.
Supervision and clerical assistance	43		42		85	
Whites—Miners	363				363	
Miners' helpers	4				4	
Labourers	259		118		377	
Mechanics and skilled labour	115		97		212	
Boys	68		46		114	
Japanese						
Chinese			120		120	
Indians	2		1		3	
Totals	854		424		1,278	

REPORTS BY THOS. R. JACKSON AND JAS. DICKSON, INSPECTORS.

NANAIMO COLLIERY.

No. 1 MINE.

Arthur Newbury, Manager; Edward Courtney, Overman, Protection Mine. John Sutherland, Overman, No. 1 Mine. Robert Adam, Matthew Broderick, William Halliday, William Neave, James Dudley, Alex. Coombs, George B. Bradshaw, John Weeks, John Devlin, John Marrs, James McMeakin, George Perry, Andrew Bennett, Joseph Dean, Neil McMillan, J. M. Brown, Thomas J. Woods, George Jardine, Josh Norris, George Moore, and Fred Nash, Firebosses.

This mine is situated at the south end of the Esplanade on the shore-line of the bay. It is the oldest working-pit in the Nanaimo district and has a large submarine area extending several miles in a seaward direction. The mine has four openings. No. 1 shaft is used for hoisting coal and the screening plant is situated at this shaft; it also serves as a downcast shaft for the

ventilation of the South side workings. The men working in the South side portion of the mine are also raised and lowered at this shaft. No. 2 shaft, which is situated about 300 feet distant from No. 1, serves as an upcast shaft for the ventilation of the South side workings. Protection shaft, which is situated on Protection island across the bay, about 1 mile distant from No. 1 shaft, serves as a downcast shaft for the ventilation of the North side workings. The men who work in the North side portion of the mine are lowered and raised in this shaft; there is a ferry in operation for taking the men to and from Nanaimo. Newcastle shaft, situated on Newcastle island, about 3 miles distant from No. 1 shaft, serves as an upcast shaft for the ventilation of the North side workings. It is also provided with a ladder-way serving as a third means of ingress and egress from No. 1 mine.

The power plant consists of two 530-horse-power Babcock & Wilcox water-tube boilers, coupled with two 208-horse-power return-tubular boilers which operate at a lower pressure than the B. & W., the steam from the B. & W. passing through a No. 8 "Locke Pressure" reducing-regulator which works very satisfactory. The B. & W. boilers were installed during 1925, being completed in October, and are equipped with chain-grate stokers, induced and forced draught fans. Copes feed-water regulators and Cochrane steam-flow meters. A new feed-pump of the Rees turbo type has been installed and giving every satisfaction.

The installation of the two new boilers dispensed with the service of two water-tube boilers and six return-tubular boilers, four of the latter being left for purpose of emergency. The present installation marks a considerable saving of both fuel and man-power.

The boilers supply steam to the power-house, which consists of two cross-compound Ingersoll-Rand compressors, each supplying 2,500 cubic feet of air a minute, and two Robb-Armstrong Corliss-valve engines which are direct-connected to d.c. generators, also to fan, hoisting, and washery engines and mine-pump. Considerable work has been done on the hoisting-engine during the past year in the way of improvements. The old style of band brake which had done service for something like forty-five years was dispensed with and a new brake of the Post type installed. This has proved to be a great improvement over the old one. New main bearings and new pistons have also been installed, with the result the old engine seems to be good for another forty-five years.

Electrical equipment consists of two generators driven by steam-engines. One generator is of the Westinghouse type, 250 kw., running at 200 r.p.m. and direct-coupled to Phoenix steam-engine, and the other is of the General Electric type, 200 kw., running at 150 r.p.m. and direct-coupled to a Robb-Armstrong steam-engine. These units supply power to all the electrically driven machinery above ground and underground. There are underground one 10-ton Westing-house motor, three 6-ton Jeffrey motors, and one 10-ton Edison motor, all of which are operated on the open overhead-trolley system; four electric hoists ranging from 30 to 140 horse-power; and a 3-stage centrifugal pump driven by a 125-horse-power motor running at 1,740 r.p.m. The power is carried into the mine by four armoured cables which enter the mine by way of the shaft; two of these are leads and two returns.

In connection with the washery plant, two centrifugal pumps of the Fairbanks-Morse type and capable of delivering 1,000 gallons of water a minute each are driven by two 40-horse-power motors. There is also a 90-horse-power motor used for the sludge-pump and a 30-horse-power motor used for driving the coal-washers. Seven motors are in use at the coal wharves for raising and lowering the coal-chutes to facilitate loading coal into scows or ships.

Firebosses and shotlighters use the Wolf safety flame-lamp; workmen use the Edison electric safety head-lamp.

Operations are being conducted in the Douglas and Newcastle seams. On the South side of the mine the Douglas seam is wrought exclusively; on the North side of the mine coal is taken from both seams. Permitted explosives are used for blasting; shots are fired by cable and electric battery; compressed air and electricity are used as motive power for haulage and drainage purposes. Hoisting-engines at the shafts are steam-driven.

Haulage on the Main levels on the North side of the mine is done by electric locomotives of the overhead-trolley type. Heavy steel rails are laid and a copper trolley-wire carried for approximately 3 miles on No. 1 level, extending from the shaft to near the foot of Lamb's incline. Haulage on the South side of the mine is a combination of electric motor and direct rope haulage on the main roads and drivers and horses are employed for the purpose of getting the cars to and from the working-faces to the main haulage.

Mine drainage from the shaft-bottom to the surface is maintained by a high-lift turbo-centrifugal 4-stage pump, with a capacity of 1,000 gallons a minute against a head of 750 feet and a speed of 1,600 r.p.m.; suction, 8 inches; discharge, 7 inches. It is direct-connected through running-gears to an Allan-Axid flow impulse turbine developing 320 b.h.p. when supplied with dry steam at 80 lb. a square inch, exhausting against a vacuum of 28 inches; speed of turbine, 6,500 r.p.m.

The development-work on the North side of this mine has been chiefly confined to driving No. 5 slope at the foot of Lamb's incline a distance of 165 feet on a grade of 1 in 3 feet and the driving of an upcast shaft for ventilating purposes. The coal in this slope is 3 feet 6 inches high and of good quality. The face-line opened up now is about 400 feet in length, with good roof. A diamond-drill was employed on the inside of the motor-road and coal 2 feet thick was located 52 feet below the floor. Two other holes were put down and the continuation of the seam definitely established.

During 1925 the No. 5 North slope had been driven down a distance of 1,000 feet and coal 8 feet thick was located, with a fair roof and good floor. The slope is now being graded to a 14° pitch and an electric hoist installed to handle the coal.

North Side Operations.

In the Douglas seam the work done was chiefly the extraction of pillars; the thickness of the seam varies from 3 to 7 feet. The Newcastle seam averages 3 feet in thickness and is worked by the long-wall method. The sections now being worked in this seam are No. 4 and New slope at Lamb's incline. In the long-wall work the undercutting is done by mining-machines of the Pick-quick cutter-bar type and Siskol punchers. Where the ground is faulty or the face is not extensive the mining is done by the Siskol machine; where there is sufficient length of face to warrant it the Pick-quick machine is used. Both machines gave good results. Compressed air is the motive power. Both machines undercut the coal to a depth of 6 feet, after which it is drilled and shot down. Brushing is done in the floor to allow the car to be taken to the face; the capacity of the cars is about 16 cwt. Roadways are carried every 36 feet. Loading is done by hand. Eight loaders are supervised by one shotlighter or fireboss. Four loaders are supervised by one faceman, who is a certificated miner. Portions of the long-wall where conditions will not permit machine-mining is worked by hand-miners.

At present coal from the pillars in the Douglas seam is being taken from the following sections of the North side of mine: No. 1 and No. 2 inclines, Protection slope, and beyond Lamb's incline. The Douglas seam is being operated by machines on the long-wall method in sections known as Nos. 2½, 5, and Poverty Row.

The ventilation of this mine is produced by a single-inlet Sirocco forcing-fan. It is 90 inches in diameter by 48 inches wide; speed, 180 r.p.m., producing 75,000 cubic feet of air a minute, with a 1.75-inch water-gauge. The fan is rope-driven by an engine 14 by 18 inches, running at 90 r.p.m. The engine-speed can be increased to 120 r.p.m. if necessary, when more air is required.

During the last visit of inspection there was passing up through Protection slopes 49,000 cubic feet of air a minute, divided into four splits, as follows:—

No. 1 Wall Split.—There was 8,000 cubic feet of air a minute passing for the use of sixteen men and three horses, which amount was fairly adequate and well conducted. Timbering was good and roadways fairly good. No explosive gas was found and this section was fairly free from coal-dust.

No. 4 Wall Split.—There was 12,000 cubic feet of air a minute passing for the use of eighteen men and five horses. Ventilation was well conducted and the roadways and timbering were good. No explosive gas was found and roadways were wet and free from coal-dust.

New Slope, Lamb's Incline, and Poverty Row.—There was 11,800 cubic feet of air a minute passing for the use of sixty men and eight horses. Roadways and timbering were good. Ventilation was well conducted, except in Poverty Row long-wall and face of No. 2½ wall, where it was found sluggish. The management was instructed to have this remedied at once.

No. 2 Wall Split.—There was 12,600 cubic feet of air a minute passing for the use of thirty-four men and five horses. Ventilation generally well conducted. Roadways and timbering were good. No explosive gas was found and the roadways were found to be fairly free from coal-dust. The percentage of methane found in the return airways of these sections by means of the B.G.D. varied from 0.1 to 0.35 per cent. methane.

South Side Operations.

The workings are all in the Douglas seam and consist chiefly of pillar-extraction.

Diagonal Slope Split.—There was 18,000 cubic feet of air a minute passing for the use of thirty-five men and eight mules. Ventilation was well conducted and timbering good. This section was fairly free from coal-dust. No explosive gas was found.

No. 5 North Split.—This slope is under repair in the form of grading and when completed mining operations will be resumed.

No. 2 Dip Split.—There was 16,000 cubic feet of air a minute passing for the use of forty men and seven mules. No explosive gas was found. Generally speaking, the roadways, timbering, and ventilation were good. This applies to Protection pillars as well.

The sections were fairly free from coal-dust owing to natural dampness and water. In the various return airways the B.G.D. showed no higher on the average than 0.3 per cent. methane.

The South side ventilation is produced by a 72- by 90-inch Sirocco double-inlet exhaust-fan, rope-driven, ratio 3.5 to 1, capable of producing 195,000 cubic feet of air a minute at a 4-inch water-gauge, steam-driven by an engine of 350 horse-power. Another fan capable of producing the necessary ventilation of the mine stands ready to substitute should necessity require. No dangerous occurrences were reported from this mine during the year.

Advantage was taken of the provisions of section 101, Rule 37, "Coal-mines Regulation Act," by the workmen to appoint their own "gas committee" for the purpose of inspecting the mine. Inspections have been made regularly during the year and copies of these reports of inspection, which were generally satisfactory, were sent to this office.

In No. 1 Dip section, off No. 3 level, an old fire area became active while pillar-extraction was being done. The seals were replaced and after the elapse of a few weeks were again broken and pillar-extracting resumed. This section is now practically finished.

In inside end of main and tail district close attention is given to the extraction of the pillars, as these pillars are being drawn from an area susceptible to spontaneous combustion. Efficient work, care, and cautiousness govern the success or failure of this particular class of work. So far results obtained have been quite successful.

Analysis of coal-dust sample tests taken in the roadways of the mine, as required by regulations issued for precautions against coal-dust, at first showed from 5 to 10 per cent. less in incombustible matter than required. Water sprays have been introduced where necessary and recent analyses show the percentage of inert matter to comply with the requirements of the "Coal-mines Regulation Act."

It is a pleasure to report that the year passed without a fatal accident occurring in this mine.

The following are the official returns for No. 1 mine for the year ended December 31st, 1925:—

SALES AND OUTPUT FOR YEAR.	COAL.		COKE.	
(Tons of 2,240 lb.)	Tons.	Tons.	Tons.	Tons.
Sold for consumption in Canada	213,807			
" export to United States	33,495			
" " other countries				
Total sales		247,302		
Lost in washing	13,709			
Used in making coke				
Used under colliery boilers, etc.	41,603			
Total for colliery use		55,312		
		302,614		
Stocks on hand first of year	8,602			
" last of year	20,142			
Difference added to stock during year		11,540		
Output of colliery for year		314,154		

AVERAGE NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, ETC.

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.
		$		$		
Supervision and clerical assistance	24		25		49	
Whites—Miners	193	7.46			193	
Miners' helpers						
Labourers	146	4.01 - 4.55	65	3.12 - 4.68	211	
Mechanics and skilled labour	76	4.55 - 5.22	51	4.92 - 5.96	127	
Boys	38	1.78 - 3.54	20	1.14 - 3.00	58	
Japanese						
Chinese			65	2.20 - 3.20	65	
Indians	1	4.30	1	3.96	2	
Totals	478		227		705	

RESERVE MINE.

Thos. Williams, Manager; Clifford Dickinson, Overman; Richard Rallison, Ernest Kelly, Jacob Stobbart, Fred Bell, George Frater, Albert Manifold, William Neilson, James McGrath, Harry Allsopp, and Harry Meikle, Firebosses.

This mine is situated in the Cranberry district, about 5 miles south of Nanaimo. The first shaft sunk reached the seam at a depth of 1,162 feet. On account of folding in the measures and heavy pitches it was decided to drive a crosscut tunnel 7 by 12 in section across the measures at a point 950 feet from the surface, with the result the seam was struck at a distance of 180 feet from the shaft. The second shaft was sunk to a depth of 950 feet and a tunnel driven across the measures for a similar distance and the seam struck. A level was then driven in the coal a distance of 300 feet connecting the two tunnels. After considerable development-work had been done from this point a new tunnel was driven across the measures from No. 1 shaft at a point 200 feet higher, penetrating the seam at a point about 200 feet distant from the shaft. This tunnel is now the main haulage of the mine.

Operations are conducted in the Douglas seam, which is very much troubled with "folds" or overlaps, which tend to make operations difficult. At times the seam pinches out and may be found underlapping or overlapping. The coal, which varies from 3 to 20 feet in thickness, is fairly hard, with a fairly good roof.

An increase in the production of coal took place during the latter months of 1925, so that at present the daily output is a little better than 700 tons.

The Main heading is in rock, but is being pushed ahead with the hope that it will sooner or later reach a good-sized seam of coal.

Outside of No. 10 Dip section there were no gob-fires. This section was reopened a few months ago for coal-mining operations and quite a large quantity of coal has been extracted to date. The old fire that existed in this dip seems to be thoroughly extinguished. Little airways have been put through in the old gob area for air to circulate in order to prevent heat radiation.

Sulphur cases were not quite so numerous this year, a circumstance that is highly gratifying.

The ventilation of this mine is produced by a pair of 90-inch Sirocco fans, connected to a 20- by 30-inch engine, rope-driven. On the engine is a drive-wheel 17 feet in diameter and on the fan-shaft is a drive-wheel 5 feet in diameter. These fans, running at an engine-speed of 16 r.p.m., are capable of producing 100,000 cubic feet of air a minute, against a 3-inch water-gauge.

A description of the surface plant at this mine has been given in former reports. The underground mechanical haulage is all carried on by means of compressed air and winches.

Edison electric head-lights are used exclusively by all the workmen; the firebosses and shot-lighters use the Wolf-type flame safety-lamp.

During the last visit of inspection to this mine general conditions were found to be good. No inflammable gas was found.

Inspector Miard examined the mine twice in addition to the writer. All report-books were examined as required under section 101, Rules 4 and 36, of the "Coal-mines Regulation Act" and entries found to be made as required by the Act.

The workmen at this mine availed themselves of the opportunity provided by the provisions of section 101, Rule 37, "Coal-mines Regulation Act," and appointed their own representatives for the purpose of examining the mine. Inspections have been made regularly during the year and reports of inspections, which were generally satisfactory, have been sent to this office.

The writer regrets to report the occurrence of a fatal accident at this mine. A tracklayer was struck on the head by a rail which was lodged on top of a passing loaded car which he himself had put there, and went ahead to the siding to await its arrival. This accident could have been avoided had deceased used better judgment in selecting a place to stand, as there was plenty of room on the siding to stand in safety.

The following are the official returns for Reserve mine for the year ended December 31st, 1925:—

SALES AND OUTPUT FOR YEAR.	COAL.		COKE.	
(Tons of 2,240 lb.)	Tons.	Tons.	Tons.	Tons.
Sold for consumption in Canada	116,564			
" export to United States	18,261			
" " other countries				
Total sales		134,825		
Lost in washing	9,726			
Used in making coke				
Used under colliery boilers, etc.	10,502			
Total for colliery use		20,228		
		155,053		
Stocks on hand first of year	1,847			
" last of year	7,912			
Difference added to stock during year		6,065		
Output of colliery for year		161,118		

AVERAGE NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, ETC.

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.
		$		$		
Supervision and clerical assistance	12		11		23	
Whites—Miners	111	6.80			111	
Miners' helpers	4	4.01			4	
Labourers	57	4.01 - 4.55	32	3.50 - 4.68	89	
Mechanics and skilled labour	17	4.55 - 5.22	28	4.92 - 5.56	45	
Boys	15	1.78 - 3.54	18	1.14 - 3.00	33	
Japanese						
Chinese			39	2.20 - 3.08	39	
Indians	1	4.30			1	
Totals	217		128		345	

REPORT BY JAMES DICKSON, INSPECTOR.

WAKESIAH MINE.

Robert Laird, Manager; Nathaniel Bevis, Overman; J. A. Challinor, George Gray, Harry Carroll, John Weber, Andrew Dean, Frank Cope, and David Stobbart, Firebosses.

This mine is situated about 2 miles from Nanaimo and operates in the Wellington seam. Some of the thicker parts of the seam are mined by the pillar-and-stall method, but the greater portion of the mine is worked on the long-wall system. In both methods of mining undercutting by coal-cutting machines is much used; the cutting being done by Mavor & Coulson and Sullivan chain machines.

In the long-wall sections nearly all the coal is loaded out by means of Mavor & Coulson conveyors and mechanical loaders. The average length of the conveyors is about 300 feet. This method makes possible the recovery of thin parts of the seam where otherwise the cost would be prohibitive.

During 1925 a new Sirocco ventilating-fan was installed to deal with the increasing length of the airways.

When last inspected in December there was 36,000 cubic feet of air a minute passing into this mine, dividing into three splits.

In the Lewis's Heading district there was 9,400 cubic feet of air passing a minute for the use of thirty-five men and four horses.

In the Slope district there was 10,500 cubic feet of air a minute passing for the use of forty men and four horses.

In the Dip section there was 6,000 cubic feet of air a minute passing for the use of fourteen men and one horse.

The firebosses use the Wolf flame safety-lamp for air-testing purposes; all other underground employees using permissible electric head-lamps of the Edison and Wheat types.

The main intakes have all been treated with incombustible dust in conformity with the regulations for precautions against coal-dust, with the result that the average of mine samples taken from these airways shows an incombustible content of 69 per cent.

During this inspection a small quantity of explosive gas was found in one place and a "cap" of gas in another place. The general condition of the timbering and roadways was good.

The following are the official returns from the Wakesiah Colliery for the year ended December 31st, 1925:—

SALES AND OUTPUT FOR YEAR.	COAL.		COKE.	
(Tons of 2,240 lb.)	Tons.	Tons.	Tons.	Tons.
Sold for consumption in Canada	61,014			
" export to United States	9,559			
" " other countries				
Total sales		70,573		
Used in making coke				
Lost in washing	3,211			
Used under colliery boilers, etc.	16,920			
Total for colliery use		20,131		
		90,704		
Stocks on hand first of year	794			
" last of year	3,878			
Difference added to stock during year		3,084		
Output of colliery for year		93,788		

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, ETC.

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.
		$		$		
Supervision and clerical assistance	7		6		13	
Whites—Miners	59	6.71			59	
Miners' helpers						
Labourers	56	4.01 - 4.55	21	3.50 - 4.68	77	
Mechanics and skilled labour	22	4.55 - 5.22	18	4.92 - 5.56	40	
Boys	15	1.78 - 3.54	8	1.14 - 3.00	23	
Japanese						
Chinese			16	2.20 - 3.08	16	
Indians						
Totals	159		69		228	

Canadian Collieries (Dunsmuir), Ltd.

Head Office—Montreal, Que.

Capital, $6,027,000.

F. Perry, President, Montreal, Que.; Lieut.-Col. C. E. Villiers, General Manager, Victoria, B.C.; H. S. Adlington, Secretary, Montreal, Que.; P. S. Fagan, Assistant Secretary, Victoria, B.C.; Thomas Graham, General Superintendent, Cumberland, B.C.

The above company operated the following mines during 1925: The Comox Colliery, Nos. 4, 5, and 6 mines, situated in the vicinity of Cumberland; the Wellington Extension Colliery, Nos. 1, 2, 3, and 6 mines, situated at Extension; and No. 5 mine, situated at South Wellington.

No. 7 mine, situated in Brights district near Haslam creek, was abandoned during the year.

The following returns show the combined output of the company's collieries during 1925:—

AGGREGATE RETURNS FROM THE CANADIAN COLLIERIES (D.), LTD., MINES FOR YEAR 1925.

SALES AND OUTPUT FOR YEAR.	COAL.		COKE.	
(Tons 2,240 lb.)	Tons.	Tons.	Tons.	Tons.
Sold for consumption in Canada	337,087			
" export to United States	64,315			
" " other countries				
Total sales		401,402		
Lost in washing	75,696			
Used in making coke				
Used under colliery boilers, etc	28,393			
Total for colliery use		104,089		
		505,491		
Stocks on hand first of year	14,230			
" last of year	12,949			
Difference taken from stock during year		1,281		
Output of colliery for year		504,210		

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, ETC.

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.
Supervision and clerical assistance	70		36		106	
Whites—Miners	464				464	
Miners' helpers	12				12	
Labourers	159		92		251	
Mechanics and skilled labour	100		119		219	
Boys			28		28	
Japanese—Miners	35				35	
Miners' helpers	27				27	
Chinese—Miners	80				80	
Miners' helpers	70				70	
Labourers	76		88		164	
Totals	1,093		363		1,456	

REPORT BY THOMAS R. JACKSON, INSPECTOR.

COMOX COLLIERIES.

These mines are situated in the Comox District, about 13 miles from Union Bay (by road). A railway about 20 miles in length connects the separate mines to a shipping-point at Union Bay, over which the whole output of coal is conveyed.

The mines in operation are Nos. 4, 5, and 6. The latter is a shaft acting as a means for drainage and intake air for No. 5 mine. No. 4 mine is located at the east end of Comox lake and is about 3 miles distant from the city of Cumberland. No. 5 mine is about a mile away from the city. No. 6 is close to the city.

The mine ventilation of Nos. 1 and 2 slopes, of which No. 4 mine is comprised, is produced by a Sullivan reversible fan, double-inlet, having a capacity of 180,000 cubic feet of air a minute, against a 6-inch water-gauge. This fan, which is located at the return end of No. 2 parallel slope, is electrically driven by a 350-horse-power induction-motor, 2,200 volts, speed 250 r.p.m., directly connected to the fan-shaft. A 108-inch double-inlet reversible Sirocco fan is situated at the return end of No. 1 slope, parallel. This fan is not being used at present and acts as an auxiliary fan.

A large area of the seam to the dip has been worked out, abandoned, and allowed to fill up with water. This great reduction of old workings, through which the air travelled at one time, has enabled the management to supply sufficient ventilation for the requirements of both slopes with but one fan running.

Advantage was taken by the workmen, under provision of Rule 37 of section 101 of the "Coal-mines Regulation Act," to appoint their own representatives for the purpose of examining the mine. Inspections have been made regularly and the reports furnished to this office have shown conditions found were generally satisfactory.

The hydro-electric plant of this company, which has been described in previous reports, has been in constant operation during the year. Sufficient electricity is generated at this plant to supply motive power to all the collieries, the wharf at Union Bay, and for the lighting of Union Bay and Cumberland.

In No. 4 mine the work during the year has been confined to the extraction of the available pillars in the various sections of the mine. In No. 5 mine no development-work has been done, apart from the continuation of preparations necessary for the successful operation of coal-cutting machinery in conjunction with conveyors.

It is a pleasure to report that no fatal accident occurred in the operation of this colliery *during the year; this is the second year in succession that no fatality has occurred in No. 4 mine.*

On November 15th, 1925, a dangerous occurrence took place in the form of an outbreak of fire in the storage-battery locomotive charging station situated in No. 11 West level, No. 1 slope, No. 4 Comox mine. The fire started from the commutator of the motor-generator set for charging the storage-batteries on the locomotive used in this section. The fire was quickly under control, although the fire-proof lining of the station was damaged. Repairs were carried out immediately.

Notice of this occurrence was sent to the Inspector of Mines in compliance with section 71, subsection (*d*), of the "Coal-mines Regulation Act."

No. 4 MINE.

William Walker, Manager; John S. Williams, Overman, No. 1 Slope; Charles Parnham, Overman, No. 2 Slope; Hugh McKinnon, Charles O'Brien, Sam Horwood, John Bennie, William Devoy, Harry Jackson, A. W. Watson, Tom Shields, William Herd, Thomas Lewis, J. H. Vaughan, Robert Walker, Watkin Williams, Alf Jones, George O'Brien, James Quinn, J. E. Spicer, E. H. Devlin, and Tom Wilson, Firebosses.

This mine consists of two slopes with but one main entrance. There is also a manway part of the way. No. 1 slope runs due north; the lower workings beyond No. 15 West level are practically abandoned. No. 2 slope runs N. 45° E. and all work is practically finished beyond No. 18 West level. These slopes diverge at a point about 75 feet from the main portal. The electric haulage-engine is so connected that trips can be run simultaneously on both slopes to a point where they converge to the main entrance.

The men are conveyed from the bottom and other sections of the slope in a man-trip at the end of each working-shaft. A safety-car is connected to the rear of the man-trip, which ensures the workmen's safety while riding up the slope. As a precaution against trips breaking away on these slopes the car is now used behind all trips ascending the slopes. Electric headlights of the Edison storage-battery type are used by the workmen and the firebosses use flame safety-lamps of the Wolf type for testing purposes.

In No. 1 slope electricity is used as the motive power to operate all pumps, winches, and motors. A storage-battery locomotive is employed for haulage purposes in No. 11 West level, which has been reopened through a pillar area for over half a mile.

The extraction of pillars is general throughout the mine. Seam varies from 3 to 7 feet.

During the last visit of inspection in December the ventilation was found good generally and no inflammable gas was found. Roadways were in fairly good condition and timbering good. Sections are fairly free from coal-dust owing to natural dampness. Many of the roadways are muddy. Some of the roadways are covered with water as high as the rails.

This mine is remarkably clear of methane gas in the return airways. The average test at the fans runs from 0.1 to 0.3 per cent. methane. I measured 120,000 cubic feet of air a minute passing into this mine in the intake airways. Only permitted explosives are used and all blasting done by means of cable and battery under the supervision of certificated officials.

The workings at the lower end of No. 2 slope from No. 15 East down are being finished; all available pillars being extracted and water allowed to accumulate in the abandoned workings.

On December 28th, 1925, all working-parts of No. 6 East and No. 7 West levels were examined; ventilation, timbering, and roadways were found in good condition. The sections are practically free from coal-dust owing to dampness and water, except between doors on No. 7 level roadway. This was ordered to be well watered in order to keep down incombustible dust raised when the door is opened.

Analysis of sample tests of coal-dust taken from the roadways of both slopes, Nos. 1 and 2, show from 5 to 10 per cent. less incombustible matter than the requirements of the "Coal-mines Regulation Act." In order to remedy this deficiency in incombustible matter fine sprays are being placed at intervals on the slope with the object of increasing the moisture content by means of water, which will bring about the necessary standard required by the "Coal-mines Regulation Act."

No. 5 MINE.

Thomas Graham, Manager; Robert Brown, Overman; Sam Jones and Robert McNeil, Firebosses.

The workings of this mine are reached by a shaft 280 feet deep and known as No. 1 seam. Not far from the shaft-bottom a slope has been driven down through the measures to another vein of coal called No. 2 seam, 115 feet vertically below No. 1 seam. No. 2 seam, which is about 40 inches high, is still in the course of development. The undercutting of the coal in the development-work is done by a Sullivan chain-cutter mining-machine.

The Edison electric head safety-lamp is used by all workmen and the firebosses use the flame safety-lamp of the Wolf type for testing purposes. Only permitted explosives are used. No blasting is done without the use of cable and battery and shots are fired under the supervision of certificated officials.

When last inspected the ventilation, roadways, and timbering were generally found good and sections practically free from coal-dust. No inflammable gas was found. On being measured, 90,000 cubic feet of air a minute was found entering the West side of this mine. The average reading of methane tests in the return is about 0.2 per cent. methane.

The engine used for hoisting purposes in this shaft, which is 280 feet deep, is a Wellman-Seaver-Morgan engine, coupled to a 300-horse-power motor, through a reduction and flexible motor, running at 250 r.p.m. Line unit is 2,200 volts, 3-phase system, 25 cycles. The hoist is equipped with single drum having two ropes attached, each of which is 1⅛ inches in diameter. An air-brake control is supplied with an overwinding prevention device and the cages are equipped with spring safety-catches. The overwinding device consists of a chain driven from the main drum-shaft on to a sprocket-wheel which operates a worm-gear carrying cams. These cams are so arranged that at the end of the travel, as the cage ascends or descends and at a predetermined point on the device which corresponds to 2 feet above the cage-landing, the cams engage movable contacts which automatically open a 440-volt circuit and in turn open the main switches, thereby cutting off all power to the winding-motor. At the same instant the switches are opened the cams engage another set of contacts, which in turn demagnetize a magnet, bringing into operation the brake, thus bringing the hoist to a full stop.

The fan producing ventilation is a 100- by 100-inch double-inlet reversible fan, driven by a motor of 250 horse-power, speed of 250 r.p.m. Line unit, 2,200 volts, 3-phase system, 25 cycles. The quantity of air produced is 200,000 cubic feet a minute, with a 6-inch water-gauge. This fan is automatically controlled with temperature relays on all bearings. This device does away with the necessity of an attendant, as any excessive temperature would be at once relayed to an electric contact, which would act in cutting off the electric current supplied to operate the fan.

No dangerous occurrence was reported from this mine during the year.

On account of this mine being in the first stages of development, mostly rock-work, and not many men engaged therein, it was considered unnecessary by the workmen to appoint a "gas committee."

It is a pleasure to report that no fatal accident occurred during the year at this mine.

No. 6 MINE.

This mine is supervised by the officials of No. 5 mine. Practically all the water entering Nos. 5 and 6 mines is hoisted from No. 6 shaft by specially constructed tanks capable of delivering 1,200 gallons a minute. During the last inspection 42,000 cubic feet of air a minute passing through to No. 5 mine was measured. Roads and timbering fair. Stoppings good.

The following are the official returns for the year ended December 31st, 1925, and the aggregate output of all the mines of the Comox Colliery:—

SALES AND OUTPUT FOR YEAR.	COAL.		COKE.	
(Tons of 2,240 lb.)	Tons.	Tons.	Tons.	Tons.
Sold for consumption in Canada	202,976			
" export to United States	1,011			
" " other countries				
Total sales		203,987		
Lost in washing	31,294			
Used in making coke				
Used under colliery boilers, etc	6,390			
Total for colliery use		37,684		
		241,671		
Stocks on hand first of year	9,663			
" last of year	8,822			
Difference taken from stock during year		841		
Output of colliery for year		240,830		

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, ETC.

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. employed.	Average Daily Wage.	No. employd.	Average Daily Wage.	No. employed.	Average Daily Wage.
Supervision and clerical assistance	42		20		62	
Whites—Miners	102				102	
Miners' helpers						
Labourers	31		44		75	
Mechanics and skilled labour	70		76		146	
Boys			7		7	
Japanese—Miners	35				35	
Helpers	27				27	
Chinese—Miners	80				80	
Helpers	70				70	
Labourers	70		39		109	
Totals	527		186		713	

REPORT BY HARRY E. MIARD, ACTING-INSPECTOR.

WELLINGTON EXTENSION COLLIERY.

Thomas A. Spruston, District Superintendent.

This colliery comprises Nos. 1, 2, 3, and 6 mines at Extension and No. 5 mine at South Wellington, all situated in the Cranberry district. The entire output of the former is brought to Ladysmith, 11 miles away, over the Wellington Colliery Railway, which also affords means of transportation to and from their work for the employees of the company residing at Ladysmith. The output of No. 5 mine reaches the same shipping-point by the Esquimalt & Nanaimo Railway, over which it is hauled for a distance of approximately 9 miles.

PROSPECTING.

Prospecting was carried on more or less actively during the greater part of 1925. The small slope opened in 1924 on an outcrop in the Bright district, about three-quarters of a mile from the main line of the Wellington Colliery Railway, was driven on the full dip of the seam, approximating 25°, until it reached a total length of 1,300 feet. Two boreholes, aggregating a total depth of 1,500 feet, were also put down during 1925. These operations were subsequently abandoned.

LADYSMITH.

The general shipping-point for the output of these mines is Ladysmith, where the coal is either loaded on vessels or sent to Mainland points in railway-cars by means of transfer-barges.

The coal-washery is equipped with three washers, each having a computed capacity of 200 tons in twelve hours, 6-compartment jigs, and four 14- by 7-foot Mascoe tables taking care of the smaller-sized coal. One of the latter was added to the equipment during the year. A very high grade of steam and domestic fuel is produced and finds a ready market in the Coast cities and at many Mainland points.

Power for the washery is supplied by a Pelton wheel and a 40-kw., 240-volt Allis-Chalmers-Bullock generator supplies power for lighting purposes to the washery and wharves.

FIRST-AID AND MINE-RESCUE TRAINING.

During the year well-attended first-aid classes were conducted by Drs. Maxwell and Jessup and a total of fifty-four men passed examinations and received certificates. In addition, six men underwent the mine-rescue training. The colliery possesses a very competent staff of qualified first-aid men. An excellently appointed ambulance railway-car is constantly maintained in readiness within a short distance of the principal mine entrance at Extension. In addition, there are also well-equipped first-aid rooms at Extension and South Wellington, with all necessary facilities to take care of emergencies. An ample supply of first-aid requisites is constantly kept

in the ambulance-boxes disseminated throughout the mines. The mine-rescue equipment consists of six 2-hour sets of the Paul breathing apparatus, one oxygen-pump, six oxygen-tanks, one pulmotor, and safety-lamps of the Wolf and Edison types.

ACCIDENTS.

Two fatal accidents occurred during the year, one in No. 2 mine at Extension and the other in No. 5 mine at South Wellington. The former was due to a fall of roof material immediately following the return of the men to a working-face where a shot had just been fired. The other was the result of a fall of coal taking place while a miner was preparing to drill a shot-hole in the rib in order to widen the roadway and allow sufficient space to pass a car conveniently.

SAFETY-LAMPS AND EXPLOSIVES.

At the Wellington Extension mines all workmen use approved Edison storage-battery electric lamps exclusively, while firebosses are also provided with Wolf safety-lamps for gas-testing purposes. Only permissible explosives are used and all shots are fired by means of electric igniters.

EXTENSION.

Nos. 1, 2, 3, and 6 mines are operated in the Wellington seam, which, in the parts at present being worked, varies greatly in thickness and structure. Dislocations of varying magnitude are very common, as are "steps," "rolls," "wants," and "barren ground." Generally speaking, these appear with increasing frequency as the south-eastern end of the field is approached.

The entire output of Nos. 1, 2, and 3 mines is brought to the tipple through a rock tunnel driven 14 by 7 in the clear and on a 1-per-cent. grade, which meets No. 1 mine at a distance of three-quarters of a mile from the surface. It continues from there to No. 2 mine, a total distance of a little over a mile. Haulage along this road is by electric locomotives, which also run about half a mile in No. 3 and 1¼ miles in No. 2 mine. The underground employees are taken to and from their work in "man-trips" hauled by a 13-ton Baldwin-Westinghouse electric locomotive.

No. 6 mine is situated about 1¼ miles to the north-west of the main tunnel and is connected to the tipple by a narrow-gauge railway about a mile in length and an incline 3,000 feet long.

Power-house.—The boiler plant consists of four Goldie & McCulloch return-tubular boilers of 163-horse-power capacity each. The electric power is supplied by three 250-volt d.c. generators. No. 1 is a Cracken-Wheeler generator of 112.5-kw. capacity, direct-coupled to a 15 by 14 Ideal engine; No. 2 is a Westinghouse of 150-kw. capacity, connected directly to a 14 by 14 by 32 Fleming-Harrisburg compound engine; and No. 3 is a General Electric of 150-kw. capacity, direct-connected to a 16 by 16 Robb-Armstrong engine. A Blake fire-supply pump 12 by 8 by 10 is maintained in good order in the boiler-house.

Wash-house.—This is a steam-heated building, providing accommodation for more than 400 men and equipped with thirty-six spray-baths, a number of hot- and cold-water taps, and dry-room. Separate locker and wash rooms are provided for the firebosses and other officials.

No. 1 MINE, EXTENSION.

James Strang, Manager; Thomas Wilson, Overman; William Bauld, William Clifford, David Coupland, David Gordon, John Greenhorn, and Alex. Orr, Firebosses.

This mine is operated in the part of the Wellington seam commonly known as the "Underlap," where the coal varies very much in thickness and mining operations are impeded at frequent intervals by folds, small dislocations, and wants. In the West Incline district, where the greater part of the output is obtained from a slope paralleling the outcrop, coal of considerable height was met in the vicinity of a fault and at the beginning of the year the method of mining had to be rapidly changed from long-wall to a double-stall system in order to adjust it to the altered conditions. The thickness of the seam there and the high inclination that it assumed in the vicinity of the fault presented difficulties that were successfully overcome in the great majority of cases, with the result that the percentage of recovery will be fairly high. In several instances it was found advisable to extract the seam in two lifts, the top coal being held up in the first operation and extracted afterwards.

Ever-increasing haulage difficulties, coupled with the serious problem presented by the drainage during the winter months, led to the abandonment of the No. 6 East district. The old No. 4 East level was reopened and extended, provisions being made to reach all intervening

coal by means of a slope driven from the new level on a moderate gradient. Very satisfactory progress has been made with this work up to the present time, and the problem involved in the disposal of the winter surplus inflow of water has ceased to be the grave source of anxiety for the management that it was in former years.

The haulage equipment consists of a 100-horse-power Ottumwa electrically driven hoist, situated at the top of the Main slope, and three smaller units, one of which handles the output of the dip workings in the No. 4 East, the other two being used in the West Incline section.

The mine is ventilated by open running twin fans of Murphy type, having a capacity of 40,000 cubic feet a minute, against a water-gauge of 1.9 inches, and driven by an Allis-Chalmers-Bullock motor. A Stine fan, directly connected to an electric motor, is used as a booster on the intake side of the No. 4 East district and assures the circulation of 14,000 cubic feet of air a minute through that part of the mine. The mine is universally damp and practically free from coal-dust. On the last inspection 16,000 cubic feet of air a minute was measured on the intake for the use of fifty men and five horses. In the case of the West Incline section this quantity is supplemented by abundant leakage of fresh air coming directly from the surface. No explosive gas was found. The roadways were in fairly good condition and the working-places generally well timbered.

No. 2 MINE, EXTENSION.

James Strang, Manager; Robert L. Spruston, Overman; George Carson, David Crawford, John Davidson, William Gilchrist, R. N. Hamilton, Ed. Heyes, Jos. Watson, and William Wesnedge, Firebosses.

The new motor-road, a little more than 7,000 feet long, connecting Nos. 2 and 17 inclines to the Main haulage-tunnel, was completed at the end of the year. The chief advantages claimed for it, over the roadway that it is intended to supplant as main haulage artery for the mine, are that it is much drier, its general gradient is in favour of the load instead of against it, and it will allow the complete or partial abandonment of two of the inclines operated at present. Moreover, it affords a greatly simplified means of communication between the different sections of the mine.

In the East Incline district the operations were practically limited to the extraction of pillars throughout the year. In the face of difficult natural conditions and of obstacles of a different order resulting from the unsystematic methods of exploitation in former days, the officials in charge displayed considerable skill and ingenuity in their efforts to assure a maximum recovery. Preparations are now being made to start work on a few pillars left below the present workings, on both the east and west sides of the incline.

In the workings of No. 2 incline operations are conducted partly on the pillar-and-stall and partly on the long-wall systems in order to overcome the difficulties presented by the great variations of the seam in thickness, structure, and inclination.

No. 17 Incline district is operated entirely on the long-wall system. The seam varies in thickness from 2 to 4 feet or more, with rock partings appearing and disappearing erratically, while complete wants are by no means uncommon. The nature of the roof varies also. The stratum immediately overlying the coal in some parts of the district is a slightly indurated clay requiring the most scrupulous care on the part of the workmen in its timbering. The whole district is wet, notwithstanding efforts made to lessen the inflow of water by draining some of the small swamps dotting the surface above these workings.

Towards the end of 1925 the extraction of a few pillars left along the abandoned part of the No. 4 East level was undertaken.

Nos. 2 and 17 inclines are ventilated by an 8-foot Stine fan, driven by an electric motor and set on top of a small shaft sunk in close proximity to No. 17 Incline workings. The East Incline district is ventilated by No. 1 mine-fan.

On the last inspection the ventilation was found good everywhere, except in a couple of places on the dip side of the No. 2 East level, East incline, where a trace of black-damp was found. No explosive gas was met. The air measurements taken were as follows: In the East incline, 14,600 cubic feet a minute for thirty-four men and five mules; in Nos. 2 and 17 inclines, 26,000 cubic feet for the use of thirty-six men and six mules. The roadways were in good condition, with the possible exception of a few points where weight had been thrown on them by the extraction of neighbouring pillars. The timbering was good throughout and the mine was generally damp and free from coal-dust.

Electrically driven hoists are handling the output on the East and No. 2 inclines, and one is also used at the head of the slope forming the continuation of No. 17 incline, but the latter is operated as a gravity-plane. Its use for this purpose will be discontinued when the new motor-road is in operation. An electric locomotive running on the No. 4 East level brings the coal from Nos. 2 and 17 inclines to the Main haulage-tunnel.

No. 3 MINE, EXTENSION.

James Strang, Manager; Thomas Strang, Overman; Dan Campbell, David Davidson, Patrick Malone, James Nimmo, and George Smith, Firebosses.

In this mine all operations during the year were limited to the extraction of pillars. Here the seam is more regular than in almost any other part of the colliery and the coal mined is of excellent quality. Maintaining the considerable length of roadways necessary to reach the different sections of the mine presents an important problem, as does also the disposal of the enormous volume of water finding its way to the workings during the rainy season. However, the management has been able to deal efficiently with both difficulties.

Considerable trouble was experienced at the beginning of the year owing to large quantities of black-damp issuing from the vast area of worked-out ground surrounding the present workings. This difficulty was set aside by transforming the fan into a blower and reversing the direction of the air-current. In the course of the last inspection the ventilation was found good everywhere and 20,000 cubic feet of air a minute was measured on the intake for the use of forty-eight men and eight horses. No explosive gas was found. The roadways were in fairly good condition, considering the nature of the ground in which they are maintained, and the timbering was generally good. The mine is extremely wet and is free from coal-dust throughout.

No. 3 mine is ventilated by twin fans of the Murphy type, encased and operated as blowers. Under these conditions they have a capacity of 30,000 cubic feet a minute, against a 1-inch water-gauge. The necessary power is supplied by a 25-horse-power d.c. electric motor.

An electrically driven 50-horse-power hoist is used to haul the coal from a newly driven diagonal slope, by means of which preparations are made to extract the large pillar remaining below the present motor-road when the latter is eventually abandoned. The coal from the upper sections of the mine is brought to the Main level by means of gravity-planes and is hauled from there to the tipple, with the rest of the output, by the electric locomotives operated in the Main tunnel.

No. 6 MINE, EXTENSION.

James Strang, Manager; Thomas Wilson, Overman; Robert Houston and Water Joyce, Firebosses.

This mine has been operated for the last three years in a small area of coal left between the outcrop of the seam and the western boundary of old No. 1 mine. The abandoned workings of the latter were also penetrated at a few points and pillars left there many years ago were largely recovered. The Main slope was driven on the full dip of the seam and levels were driven on both sides, until the wastes on the left and either the outcrop or faults on the right were encountered. *It has been a successful operation, amply justifying its undertaking.* The seam was mined on both the pillar-and-stall and the long-wall system, according to the nature of the ground, but the operations are now conducted on a much reduced scale.

A 100-horse-power steam-hoist is hauling the coal out of the slope and is also dropping it down the 3,000-foot surface incline, from the foot of which it is hauled to the tipple by an electric locomotive. The mine is ventilated by No. 1 mine-fan. During the last inspection 6,100 cubic feet of air a minute was measured on the intake for the use of twenty-five men and three horses. *No explosive gas was found and the mine was damp and practically free from coal-dust.*

In compliance with the requirements of the regulations for precautions against coal-dust forming part of the "Coal-mines Regulation Act," samples of the fine material lying on the driest parts of the roadways were gathered and were tested in order to ascertain their moisture and ash contents. The following are the results of the tests made on samples submitted from the Wellington Extension Nos. 1, 2, and 3 mines:—

No. 1 mine: Screen analysis, plus 10-mesh, 45.7 per cent.; plus 28-mesh, 26.8 per cent.; *minus 28-mesh, 27.5 per cent.* Test made on minus 28-mesh: Moisture, 7.78 per cent.; ash, 51.60 per cent.; total non-combustible, 59.38 per cent.

No. 2 mine: Screen analysis, plus 10-mesh, 33 per cent.; plus 28-mesh, 33 per cent. Minus 28-mesh: Moisture, 6.73 per cent.; ash, 47.40 per cent.; total non-combustible, 54.13 per cent.

No. 3 mine: Screen analysis, plus 10-mesh, 57.3 per cent.; plus 28-mesh, 26 per cent.; minus 28-mesh, 16.7 per cent. Test made on minus 28-mesh: Moisture, 4 per cent.; ash, 60.80 per cent.; total non-combustible, 64.80 per cent.

The following are the official returns from the Wellington Extension Colliery for the year ended December 31st, 1925:—

SALES AND OUTPUT FOR YEAR.	COAL.		COKE.	
(Tons of 2,240 lb.)	Tons.	Tons.	Tons.	Tons.
Sold for consumption in Canada	97,762			
" export to United States	63,304			
" " other countries				
Total sales		161,066		
Lost in washing	34,385			
Used under colliery boilers, etc.	17,297			
Total for colliery use		51,682		
		212,748		
Stocks on hand first of year	4,567			
" last of year	4,127			
Difference taken from stock during year		440		
Output of colliery for year		212,308		

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, ETC.

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.
Supervision and clerical assistance	26		15		41	
Whites—Miners	283				283	
Miners' helpers	12				12	
Labourers	102		25		127	
Mechanics and skilled labour	22		35		57	
Boys			21		21	
Japanese						
Chinese	6		49		55	
Indians						
Totals	451		145		596	

REPORT BY HARRY E. MIARD, ACTING-INSPECTOR.

WELLINGTON EXTENSION, No. 5 MINE, SOUTH WELLINGTON.

Thos. A. Spruston, Manager; William Brown, Overman; Robert Ewing, William Frew, Neil McIntyre, Thos. Robson, and Henry Sharpe, Firebosses.

This mine, operated in the Douglas seam, is situated at South Wellington, in the Cranberry district, and adjoins the old Alexandria mine. A small spur connects it to the main line of the Esquimalt & Nanaimo Railway, over which the output is shipped to Ladysmith for distribution.

The surface equipment consists of four Goldie & McCulloch return-tubular boilers of 163-horse-power capacity each; one 250-volt d.c. Cracken-Wheeler generator of 112-kw. capacity, directly connected to a 15 by 14 Ideal engine; one 250-volt d.c. Allis-Chalmers generator, 112-kw.

capacity, directly coupled to a 16 by 16 Skinner engine; one Sullivan air-compressor; and a supply-pump. The tipple is provided with a revolving dump, chain car-haul, shaker screens, picking-table, loading-boom, and a conveyor arrangement for boiler-coal.

The entire output is hauled up the Main slope by a first-motion steam-hoist, with 18 by 36 engines, situated on the surface. A 100-horse-power Ottumwa hoist is operated on the North Diagonal slope and a 50-horse-power compressed-air-driven hoist handles the output of the No. 6 South slope, which is afterwards delivered to the Main slope by a 6-ton Jeffery electric locomotive. Several small compressed-air hoists are used at various points in the workings of the North side where the inclination of the seam precludes the safe handling of pit-cars by draught animals. Drainage is provided for by a large electrically driven turbine-pump, situated at one of the lowest points in the mine, and the discharge-line reaches the surface through a bore-hole 454 feet in depth.

The mine was closed in March, 1924, and from then on until the middle of November of the same year only a few men were employed in loading coal for the boilers and attending to the most urgent repairs. Then operations were resumed on a moderate scale in the No. 6 South Slope district. In the meantime the roadways on the North side had deteriorated badly, but the necessary repair-work was undertaken and prosecuted with sustained activity until No. 20 Left level was reached towards the end of November, 1924. The district being in fairly good condition, the production of coal was resumed there almost immediately. At the time of writing roadways connecting the North diagonal to the Main slope are being reopened. In the No. 6 South Slope district the extraction of pillars had been proceeded with systematically during 1925.

The mine is ventilated by a No. 60 Keith fan, electrically driven. In the course of the last inspection a total quantity of 32,000 cubic feet of air a minute was measured on the main intake. Of this, 9,300 cubic feet was supplied to the No. 6 South Slope district for twenty men and one horse, while 18,600 cubic feet was circulating through the workings of the North side for the use of forty-three men and six horses. No explosive gas was found; the roadways were in fairly good condition, considering the fact that a large section of the mine had just been reopened and was still partially under repairs, and the timbering was generally good. The mine was practically free from coal-dust.

Dust gathered in the driest parts of the roadways was submitted to the fineness and combustibility tests prescribed by the "Coal-mines Regulation Act," with the following results: Screen analysis, plus 10-mesh, 20 per cent.; plus 28-mesh, 25.8 per cent.; minus 28-mesh, 54.2 per cent. Test made on minus 28-mesh: Moisture, 4.25 per cent.; ash, 56.60 per cent.; total non-combustible, 60.85 per cent.

The following are the official returns from the No. 5 South Wellington Colliery for the year ended December 31st, 1925:—

Sales and Output for Year.	Coal.		Coke.	
(Tons of 2,240 lb.	Tons.	Tons.	Tons.	Tons.
Sold for consumption in Canada	36,349			
" export to United States				
" " other countries				
Total sales		36,349		
Lost in washing	10,017			
Used under colliery boilers, etc.	4,706			
Total for colliery use		14,723		
		51,072		
Stocks on hand first of year				
" last of year				
Difference { added to / taken from } stock during year				
Output of colliery for year		51,072		

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, ETC.

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.
Supervision and clerical assistance	2		1		3	
Whites—Miners	79				79	
Miners' helpers						
Labourers	26		23		49	
Mechanics and skilled labour	8		8		16	
Boys						
Japanese						
Chinese						
Indians						
Totals	115		32		147	

REPORT BY THOS. R. JACKSON, INSPECTOR.

Granby Consolidated Mining, Smelting and Power Co., Ltd.

Col. J. T. Crabbs, President, New York City; Chas. Boeking, Vice-President, Anyox, B.C.; Edward Everett, Secretary, New York City; H. R. Plommer, Treasurer, Vancouver, B.C.

No. 1 MINE.

Robert Henderson, Manager; Alexander McLaughlin, Overman; Albert Radford, Matthew Meek, John Wright, Tom Cunliffe, Wm. Harmison, and John Dean, Firebosses.

Granby Colliery No. 1 mine is situated some 10 or 11 miles in a southerly direction from Nanaimo. The main entrance to this mine is by a slope 7 by 14 feet in the clear to allow for a double track and is timbered by 12- by 14-inch framed sets, 4 feet centre to centre. A separate manway is provided for a travelling-road and it at the same time forms an intake airway. The Douglas seam, which varies 3 to 20 feet in thickness, is worked in the mine and system of work adopted is the pillar and stall. The general dip of the seam is about 18°. At the bottom of the Main slope, which is over a mile in length, two rock tunnels have been driven to the south for about 2,200 feet, opening up a new area through a fault, which is known as No. 7 South section. Quite a large coal-bearing area exists and can be exploited beyond the fault which the tunnels penetrated. Headings and levels are being driven into the field as expeditiously as conditions will permit.

Outbursts of coal and gas have not been so prevalent in this mine during 1925. In fact, these outbursts have been practically confined to the newly opened field in No. 7 South and it is gratifying to note none of them have been of a violent character. Pilot-holes (now four in each place instead of three) are kept well drilled up as a means to permit the occluded gases to bleed off. A high pressure of gas flowing out of any drill-hole has as yet not been encountered, although a gradual oozing-out of gas occurs.

This mine is ventilated by a Sirocco fan having a capacity of 150,000 cubic feet of air a minute, with a 3.5-inch water-gauge. This fan is driven by a 150-horse-power Westinghouse electric motor. The main hoist is a Vulcan 18- by 36-inch double-drum, second-motion hoist. The mine-cars are large and have a carrying capacity of 1.75 tons of coal. No mules or horses are used in this mine. Compressed air is used underground for the driving of drills, pumps, and winches. A Rand cross-compound condensing compressor, with capacity of 2,000 cubic feet of air a minute, furnishes the power. Electric power is supplied by an Allis-Chalmers 450-kw. generator (2,300-volt, 3-phase, 60-cycle, 300 r.p.m.), also an auxiliary unit, 250-kw. (2,300-volt, 3-phase, 60-cycle, 450 r.p.m.), both direct-connected to vertical high-speed engines of the Goldie & McCulloch type. The remainder of the electric equipment is of the Westinghouse type. The power-house is equipped with the Bowser oil-canalling system. A Worthington fire-pump, capacity of 1,000 gallons a minute, size 18 by 10 by 12 inches, is ever in readiness for emergency.

A large house called the "change-house" is used by the miners for the purpose of changing their clothes in. An attendant is in charge whose duty is to keep the place clean, well ventilated and heated. The heat produced in the drying-room is sufficient to make the mine-clothes perfectly dry and comfortable for the workmen to don before they go to work in the mine. The change-house is equipped with steel lockers which are heated with steam-coils from underneath. There are shower-baths and large lavatory, including every convenience for the use of the workmen.

Edison electric head-lamps are used for underground lighting to the exclusion of flame safety-lamps. The Wolf flame safety-lamp is used by the firebosses for testing purposes. Each fireboss carries an electric head-lamp as well.

In the matter of moistening the air and coal-dust on the Main slope and manway, both intakes, the air is heated by exhaust steam passing through radiators and allowed to travel in the air down the mine, thus to some extent preventing the drying-out of the mine. Very fine fog sprays are placed about every 150 feet apart on the Main slope and these operate automatically for twenty minutes out of every hour. Farther in the mine, where these measures have little or no effect, the main roadways are liberally treated with inert dust and water to such extent that the sample tests for coal-dust show an incombustible content in compliance with the requirements of the "Coal-mines Regulation Act."

Under the requirements of section 71, "Coal-mines Regulation Act," there have been reported to me during the year the occurrence of fifteen outbursts of coal and gas in this mine. This number was made up as follows: September, 4; October, 2; November, 5; and December, 4. This is exactly half the number that was reported last year. It is very gratifying to notice the reduction in number and reports show that the intensity of these blow-outs has very much lessened. It should be pointed out that nine of the fifteen blow-outs occurred in the newly opened district in No. 7 South since November. The precautionary measures for the safety of the men is being well maintained. The quantity of gas given off now by these blow-outs is not so great. The men are rarely sent home, but are detained until the gas is removed, when they are then allowed to return to work, which may be, on an average, from forty to sixty minutes' duration.

During the last inspection of this mine, which was on December 23rd, the following conditions prevailed:—No. 7 South Level section: Ventilation good. An increase of 2,570 cubic feet of air a minute passing since visited on December 17th. Roadways—timbering was good and the drilling well maintained. Explosive gas was found at Main level face where blow-out occurred and from several drill-holes in other places. The counter-level had about ½-inch gas-cap at face near roof. There was 1 to 1½ per cent. of methane in the air-current passing through these places. General conditions were good. A gratifying feature of the coal produced by recent blow-outs was the quantity of small and fairly large lumps that were present, indicating that less violence existed with this blow-out. All reports were examined as required under section 101, Rules 4 and 36, of the "Coal-mines Regulation Act" and found entries being made as required.

Advantage was taken of the provisions of Rule 37, section 101, "Coal-mines Regulation Act," by the workmen to appoint their own representatives for the purpose of examining the mine. Inspections have been made regularly during the year and reports of inspection, which were generally satisfactory, sent to this office.

A fatal accident occurred in this mine when a fireboss, in attempting to jump clear off the loaded trip he was riding on up the Main slope, miscalculated the place and distance and was violently thrown against the side of the slope and run over by the cars and injured so severely that he died a few hours afterwards. This accident might have been avoided had greater care been exercised under the hazardous circumstances.

Analysis of samples of coal-dust taken from the roadways of this mine show a percentage of incombustible matter slightly in excess of the requirements of the "Coal-mines Regulation Act."

The following are the official returns for the Granby Colliery for the year ended December 31st, 1925:—

SALES AND OUTPUT FOR YEAR. (Tons of 2,240 lb.)	COAL. Tons.	COAL. Tons.	COKE. Tons.	COKE. Tons.
Sold for consumption in Canada	133,483			
" export to United States	13,395			
" " other countries				
Total sales		146,878		
Lost in washing (Tons. 33,234)				
Less recovered from dump (3,278)	29,956			
Used under colliery boilers, etc.	16,268			
Total for colliery use		46,224		
		193,102		
Stocks on hand first of year	1,465			
" last of year	1,164			
Difference taken from stock during year		301		
Output of colliery for year		192,801		

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, ETC.

CHARACTER OF LABOUR.	UNDERGROUND. No. employd.	UNDERGROUND. Average Daily Wage.	ABOVE GROUND. No. employed.	ABOVE GROUND. Average Daily Wage.	TOTALS. No. employed.	TOTALS. Average Daily Wage.
		$		$		$
Supervision and clerical assistance	9	7.00	8	6.20	17	6 62
Whites—Miners	135	6.90	.....	.....	135	6.90
Miners' helpers	.....	.....	42	4.27	123	4.43
Labourers	61	4.59	20			
Mechanics & skilled labour.	.....	.....	.....	.....	.....	.....
Boys	.....	.....	.....	.....	.....	.....
Japanese	.....	.....	.....	.....	.....	.....
Chinese	.....	.....	.....	.....	.....	.....
Indians	.....	.....	.....	.....	.....	.....
Totals	205	6.21	70	4.49	275	5.77

REPORT BY JAMES DICKSON, INSPECTOR.

The Nanoose-Wellington Collieries, Ltd.

Head Office—Lantzville, B.C.

Capital, $3,000,000.

Alvin W. Defiel, Chairman, St. Paul, Minn.; John A. Coleman, Managing Director, Lantzville, B.C.; Russel H. Phinney, Secretary, St. Paul, Minn.; Norman B. Roy, Assistant Secretary, Lantzville, B.C.; Martin N. Olsen, Treasurer, Lantzville, B.C.

LANTZVILLE MINE.

James B. Jemson, Superintendent; Joseph Neen, Overman; H. M. Davidson, W. H. Moore, W. Angell, George Yarrow, W. Bradley, D. Caldwell, W. Nuttall, T. Chapman, and A. Derbyshire, Firebosses.

This mine is situated on the shore at the southern end of Nanoose bay, about 9½ miles north of Nanaimo. The seam worked here is the Wellington, which in this area varies in thickness from 1 to 12 feet. Bands of rock of varying degrees of hardness and thickness are

persistent in the seam throughout the workings of this mine; the most uniform part of the seam is the lower bench of coal, which averages 24 inches in thickness, while the upper benches of coal and rock vary in thickness in the different parts of the mine.

Both long-wall and pillar-and-stall methods are practised according to which is found to best suit the different districts. Part of the long-wall is worked by hand-mining, while in one of the newer sections a face 150 feet in length is being undercut by a Sullivan chain-cutter and the coal is loaded on to a face conveyor, which in turn delivers the coal to a mechanical loader, from which it is discharged into the mine-cars.

The workings are divided into two ventilating-splits. When last inspected in December 12,000 cubic feet of air a minute was passing in the No. 1 split for the use of sixty men and five horses. In No. 2 split there was 10,000 cubic feet of air a minute passing for the use of thirty-five men and five horses.

The following are the official returns from the Nanoose-Wellington Collieries for the year ended December 31st, 1925:—

Sales and Output for Year.	Coal.		Coke.	
(Tons of 2,240 lbs.)	Tons.	Tons.	Tons.	Tons.
Sold for consumption in Canada	53,231			
" export to United States	2,598			
" " other countries				
Total sales		55,829		
Lost in washing	11,064			
Used under colliery boilers, etc	8,899			
Total for colliery use		19,963		
		75,792		
Stocks on hand first of year	1,022			
" last of year	910			
Difference taken from stock during year		112		
Output of colliery for year		75,680		

Number of Hands employed, Daily Wages paid, etc.

Character of Labour.	Underground.		Above Ground.		Totals.	
	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.
		$		$		$
Supervision and clerical assistance	11	6.35	6	6.02	17	6.23
Whites—Miners	94	4.64			94	4.64
Miners' helpers	17	4.06			17	4.06
Labourers	41	4.22	8	4.02	49	4.19
Mechanics and skilled labour	7	4.40	17	4.95	24	4.79
Boys	14	3.16	8	2.42	22	2.89
Japanese						
Chinese			18	2.77	18	2.77
Indians						
Totals	184	4.47	57	3.89	241	4.33

East Wellington Coal Company.

H. G. S. Heisterman, President, Victoria, B.C.; P. S. Fagan, Secretary-Treasurer, Victoria, B.C.

EAST WELLINGTON COLLIERY.

Wm. Wilson, Manager; William Roper, Overman; George Oswald, James Rallison, D. McMullan, J. W. Shipley, and Joseph Wilson, Firebosses.

This mine is situated at East Wellington and operates in the Wellington seam; the seam here being reached by means of two slopes. The Main slope is 1,221 feet long, on a pitch of 25°; this also serves as the main ventilating-intake for the mine and is the haulage-way for men and coal. The coal is practically all mined by the long-wall method, and most of this is machine-mined by Sullivan long-wall chain-cutters driven by compressed air. There are two machine-mined long-wall faces, one being 550 feet long and the other 300 feet long.

All haulage underground is performed by compressed-air winches, with the exception of the Main slope, where the trips are hoisted by a second-motion steam-driven engine. The men ride on this Main slope in a trip of cars constructed for this purpose; in addition to the ordinary couplings, a 1-inch diameter steel rope is connected from the last car, through all the three cars, to the main haulage-rope.

When last inspected in December there was 21,000 cubic feet of air a minute passing for the use of sixty-one men and two horses. The working-places were found clear of gas with one exception. The timbering and general conditions were good.

The following are the official returns for the East Wellington Colliery for the year ended December 31st, 1925:—

Sales and Output for Year.	Coal.		Coke.	
(Tons of 2,240 lb.)	Tons.	Tons.	Tons.	Tons.
Sold for consumption in Canada	42,483			
" export to United States				
" " other countries				
Total sales		42,483		
Lost in washing	4,170			
Used under colliery boilers, etc.	7,431			
Total for colliery use		11,601		
		54,084		
Stocks on hand first of year	85			
" last of year	359			
Difference added to stock during the year		274		
Output of colliery for year		54,358		

Number of Hands employed, Daily Wages paid, etc.

Character of Labour.	Underground.		Above Ground.		Totals.	
	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.
		$		$		$
Supervision and clerical assistance	2	8.33	3	4.72	5	6.52
Whites—Miners	50	6.03			50	6.03
Miners' helpers						
Labourers	27	4.56	4	4.19	31	4.37
Mechanics and skilled labour	11	5.75	8	5.67	19	5.71
Boys	6	3.11	9	2.26	15	2.68
Japanese						
Chinese			13	2.53	13	2.53
Indians						
Totals	96		37		133	

King & Foster Coal Co., Ltd.

(ISLAND COLLIERIES, LTD.)

Head Office—Herald Building, Nanaimo, B.C.

NOS. 2, 5, 6, AND 7 MINES.

Henry Shepherd, Superintendent; S. K. Mottishaw, Manager; John Michek and George Stewart, Firebosses.

These mines operate in the Wellington seams, near Wellington, Nos. 5, 6, and 7 being in the main Wellington seam, and No. 2, which is the largest mine, in the Upper seam, which here overlies the main seam for a distance of 35 feet. Nos. 5, 6, and 7 mines are recovering the outcrop pillars left from the original mining operations of the Wellington Colliery Company, which ceased mining in this area about twenty-five years ago. There are ten men employed in this part of the operation. No. 2 mine is entered by means of two slopes, the portals of which are several hundred yards apart; both slopes being used as haulage-roads, the power being supplied by small second-motion haulage-engines and vertical boilers. This mine is worked on the long-wall system and when last inspected in December was found to be in good working condition.

The ventilation is supplied by a small steam-driven fan, which was producing a current of 6,300 cubic feet of air a minute for the use of thirty-five men and four horses. No inflammable gas was found. All underground employees use the Edison electric cap-lamp, with the exception of the firebosses, who use the Wolf flame safety-lamp for testing.

The screening and loading plant is situated at the railway, about 1 mile from the mines, and the haulage between these points is done by a gasolene-locomotive.

The following are the official returns for the King & Foster Coal Company (Island Collieries, Limited) for the year ended December 31st, 1925:—

SALES AND OUTPUT FOR YEAR.	COAL.		COKE.	
(Tons of 2,240 lb.)	Tons.	Tons.	Tons.	Tons.
Sold for consumption in Canada	16,430			
" export to United States				
" " other countries				
Total sales		16,430		
Used in making coke				
" under colliery boilers, etc	218			
Total for colliery use		218		
		16,648		
Stocks on hand first of year				
" last of year				
Difference { added to / taken from } stock during year				
Output of colliery for year		16,648		

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, ETC.

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.
		$		$		$
Supervision and clerical assistance	4	6.60	2	7.00	6	6.66
Whites—Miners	35	5.45	.....	.....	35	5.45
Miners' helpers	11	4.50	.....	.....	11	4.50
Labourers	14	4.00	.....	.....	14	4.00
Mechanics and skilled labour	13	5.00	.....	.....	13	5.00
Boys	.....	.....	.....	.....	.....	.....
Japanese	.....	.....	.....	.....	.....	.....
Chinese	.....	.....	.....	.....	.....	.....
Indians	.....	.....	.....	.....	.....	.....
Totals	77	....	2	....	79	....

NORTHERN INSPECTION DISTRICT.

REPORT BY T. J. SHENTON, INSPECTOR.

Telkwa Collieries Co., Ltd.

J. McNeil, Managing Director; A. Robinson, Mine Foreman; J. Watson, First-aid Man.

GOAT CREEK.

The mine operated during the months of January, February, and March; then closed down temporarily for the summer months, and recommenced operation in the month of October and operated continuously to the end of 1925. Average number of men employed daily was six and the output for the year was 1,681 tons.

The mine has developed a fine vein of coal of good quality, the average thickness of which is 6 feet. A shaft has been sunk during the year to connect with the workings of the mine at the lower point. This shaft now serves as a second means of ingress and egress and the ventilation of the mine has been improved thereby. Under the present management the system of operation has continued to improve and a fair amount of development has been done to meet future demands.

Fair provision has been made for the accommodation of the employees. A good log building serves as bunk-house; there is a mess-house and a dry-room supplied with shower-bath and facilities for the men to dry their clothes. The first-aid work is in charge of J. Watson and Dr. Paine, of Telkwa, attends in case of injury. Good progress has been made in bringing the mine conditions to the point desirable, and as called for by the "Coal-mines Regulation Act."

The following are the official returns from the Telkwa Colliery for the year ended December 31st, 1925:—

SALES AND OUTPUT FOR YEAR.	COAL.		COKE.	
(Tons of 2,240 lb.)	Tons.	Tons.	Tons.	Tons.
Sold for consumption in Canada	1,581	.....	.....	.....
" export to United States	.....	.....	.....	.....
" " other countries	.....	.....	.....	.....
Total sales	.....	1,581	.....	.....
Used in making coke	.....	.....	.....	.....
Used under colliery boilers, etc.	.....	.....	.....	.....
Total for colliery use	.....	.....	.....	.....
Stocks on hand first of year	.....	.....	.....	.....
" last of year	.....	.....	.....	.....
Difference { added to / taken from } stock during year	.....	.....	.....	.....
Output of colliery for year	.....	1,581	.....	.....

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, ETC.

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.
		$		$		$
Supervision and clerical assistance	1	7.00			1	7.00
Whites—Miners	2	5.00			2	5.00
Miners' helpers	2	4.00			2	4.00
Labourers	1	4.00			1	4.00
Mechanics and skilled labour			1	5.00	1	5.00
Boys						
Japanese						
Chinese						
Indians						
Totals	6		1		7	

NICOLA-PRINCETON INSPECTION DISTRICT.

REPORT BY JOHN G. BIGGS, INSPECTOR.

I have the honour to submit my annual report as Inspector of Mines for the Nicola-Princeton District for the year ended 1925.

The coal-mining companies operating in this district during the past year were: The Coalmont Collieries, Limited; Middlesboro Collieries, Limited; Keystone Coal Company, Limited; the Princeton-B.C. Colliery Company, Limited; and the Tulameen Valley Coal Company. A small amount of work was done on some coal-showings in the north-west portion of the Nicola basin, about a mile north of the city of Merritt, by a syndicate known as the Sunshine Coal Company, Limited.

It is again gratifying to have the pleasure to report that there has been no fatal accident in this district during 1925, which I feel sure can only be attributed to the care taken by the various officials and employees in trying to make the operation of the mines as safe as possible.

The coal-seams operated in this district, owing in some cases to the unusual thickness, faulted nature of the measures, and character of the coal, are susceptible to spontaneous heating, and crushed pillars, caves, and gobs where heating occurs are in most cases extremely hard to deal with. Care and attention should at all times be given to any matter that will help to eliminate these disturbing and dangerous occurrences. The past year has been free from this source of trouble with one exception. On the night of March 26th a very dangerous fire occurred at the No. 3 mine, Coalmont Colliery, and as a result the output of this colliery was curtailed for some time. This mine has been developed from the croppings by two large and well-maintained levels, following the strike of the seam a distance of 3,000 feet into this portion of the coal-basin, which contains a series of coal-seams having an aggregate thickness of about 180 feet, intersected by small bands of shale. Operations at the time the fire occurred were being conducted in the third seam of the series, and, as to be expected in a field of this description, numerous faults and folds have been encountered and the coal found is very friable.

Owing to the state of trade this mine, which was the largest producer of this colliery, had not been operated for a few days prior to the occurrence of the fire. The ventilating-fan had not been running and the only work done was the inspection of the mine and the running of the pumps on night shift. It was most unfortunate that this fire was not discovered sooner, as there is no doubt it had been active for some time. As in most cases of this description, a few hours may mean the difference between success and failure in dealing with same. Staying at the camp on the night of March 26th with the intention of making an inspection of this mine the following day, the writer was called by the management about 11 p.m. and advised that there was a fire in the No. 3 mine. Immediately proceeding to the mine, conditions were discovered which not only appeared serious, but impressed one as being almost a hopeless case. Dense volumes of smoke were issuing from the fan-drift. Accompanied by the manager and fireboss, an attempt was made to make an inspection of the mine and try and locate the point of origin of the fire. Proceeding along the Main level, we entered the No. 1 slope, but did not proceed far before we

met dense volumes of smoke which we found to be backing towards the Main level, and to all appearances the location of the fire appeared to be on the right or east side of the No. 1 slope, where a section of pillars was being extracted. To protect the mine in case a fire occurred in this section, a concrete stopping, provided with a door which was kept open, had been erected in the counter or "airway." This door could be closed at once in case a fire occurred in this section and would seal off the whole section; however, it was found impossible to penetrate the dense fumes issuing and get anywhere near it. It was then decided the fan should be started and follow the air-current around to this stopping and try to get the door closed, but unfortunately the fan appeared to have little effect in removing the smoke and fumes which kept backing up the slope. It was then decided to reverse the ventilation and follow the air-current along the counter-level to the stopping situated in the No. 1 East side airway, and again it was found that the fan had little effect in clearing the counter-level, and we were only able to get a very short distance along the counter-level owing to the fumes.

The ventilation was changed back to its original course and the camp water-mains were connected to the mine air-line and an effort made to get water through the air-lines to the seat of the fire, but it was found impossible to do so owing to the dense smoke issuing. It was very apparent that the fire was rapidly getting worse and the saving of the mine would require some quick action. Temporary stoppings were hurriedly built and the area sealed. This served as a check until such times as stoppings of a permanent character could be erected. These stoppings were built on the main and counter levels at the inside of the "heading," 800 feet from the entrance to the mine, and resulted in the suspension of operations at the time from March 26th until August 23rd.

The stoppings used for sealing were double-boarded stoppings, sheared back into the ribs, provided with valves and well treated with cement grout, applied from time to time by a cement-gun operated by compressed air, which to all appearances made a perfect seal on the mine. It may be stated that while making preparation for the erection of the permanent stopping in the counter-level, and notwithstanding the fact that a temporary stopping had been built a few feet inside the last crosscut between the counter and the main level where there was 30,000 cubic feet of air a minute passing, and conducted by brattice to where the men were working, the fumes were so strong that it was found necessary to work these men in three-minute relays. These stoppings were watched very carefully and samples of the air at the valves taken from time to time. A short time after the mine had cooled down it was found that the atmospheric conditions greatly affected the action of the air at these valves, for upon opening the same, with a rising barometer, it was found that the outside atmosphere could feed through the valves, and with a falling barometer the gas inside the stopping would issue through these valves, and not only the atmospheric changes but the temperature at different parts of the day would affect the action of the air at these valves, which would indicate there was almost a perfect seal on this mine. When operating, methane was seldom found in this mine; however, after sealing, samples of air taken at the stoppings, of gas issuing therefrom, contained a high percentage of methane, which can be attributed to the distillation of the hydrocarbons by the heat from the fire. Samples were taken from time to time and mailed to the Department of Mines at Ottawa for analysis. The chemical analyses of the last samples taken on August 4th were as follows:—

	Sample at Main Level Valve. Per Cent.	Sample of Air at Counter-level. Per Cent.
Carbon dioxide	3.61	3.74
Oxygen	1.78	1.90
Methane	22.56	21.61
Carbon monoxide	.....	.....
Nitrogen	72.05	72.75
	100.00	100.00

It was decided by the management that they would try and open this mine on Sunday, August 24th, and while conditions indicated the fire had been extinguished, there was no means of actually ascertaining that such was the case, and it is not hard to imagine what might occur in a large mine of this description if there should still be fire when these seals were broken and the mine-fan forcing the gases over the same. Five sets of apparatus had been provided by this company and a number of the officials and other employees had taken a course of training some

time ago, but there had been a serious lack of supplementary training, which is absolutely essential for success in the use of this apparatus. There are three important points to be attained for successful operations in the use of the apparatus—proper organization; the men must not only understand the action but the principle of and construction of the apparatus; they must have full confidence in the use of the same. The above can only be attained by proper training and regular practice at frequent intervals. Without this there is a possibility of the apparatus being more of a danger than otherwise. When a call comes for the apparatus it is generally wanted quickly and speed and efficiency may mean the difference between success and failure. Nothing can be more satisfactory to an operator, or even better insurance, than to be, when occasions demand, well provided with the necessary apparatus and equipment and a sufficient number of employees thoroughly trained in the use of the same. During the time operations were suspended at this mine two mine-rescue teams, consisting of ten picked men, underwent a vigorous course of training, and as a result were not only thoroughly conversant with the action of the apparatus, but gained confidence in the use of the same by training in the smoke-room at the station and in the mine.

When it was decided to reopen the mine, it was advisable that before restoring the ventilation a line of new stoppings should be erected inside and isolate the fire area in the smallest possible space. To do this required the use of self-contained breathing apparatus, and with this object in view small openings were made in the stoppings, just large enough to allow a man to pass, and the small openings were sealed by means of canvas after the men had passed through.

These men, chosen to do the work, were well trained and had full confidence in the apparatus, were properly organized, and provided with extra oxygen-tanks with mouth-pieces attached. The apparatus was carefully tested and examined before being used and a sufficient supply of oxygen and cardoxide provided. The crews knew just what they had to do and worked to schedule. They were checked when they left the base and also when they returned. A pulmotor was kept at the base and five extra sets of apparatus, which had been brought from the Middlesboro Station. On August 24th work from the counter-level base was begun and the crews were successful in sealing off to the No. 2 slope, and the following day, Monday, August 25th, they worked from the main level base and were again successful in sealing up the entrance to the No. 2 slope. When the main seals of the mine were broken the fan was started and the air-current circulated through the inside level section of the mine. The temporary stoppings erected by the rescue crews were supplemented by permanent stoppings. The apparatus functioned perfectly, which showed the extreme care of not only the teams, but the care of the attendants at the base.

This opportunity is taken to compliment these men for the time they have devoted to training and also for the splendid way they successfully carried out this most arduous task. Several members of the team on August 23rd worked continuously for five hours, wearing the apparatus, in an irrespirable atmosphere, several hundred feet from fresh air, and every credit is due George Murray, Joseph Thompson, James Simm, William Richardson, William Muir, Henry Horne, Thos. Gibson, Peter Hunter, and James McWhirter for the splendid way they acquitted themselves on this occasion.

Middlesboro Collieries, Ltd.

E. W. Hamber, President, Vancouver, B.C.; C. S. Raphael, Vice-President, Vancouver, B.C.; Thos. Sanderson, Secretary, Vancouver, B.C.; C. M. O'Brian, Treasurer, Vancouver, B.C.; Robert Fairfoull, Superintendent, Vancouver, B.C.

MIDDLESBORO COLLIERY.

Robert Fairfoull, Manager.

This colliery, which is connected by a branch line of the Kettle Valley Railway, is situated 1 mile west of the city of Merritt. It is at present operating in the lower or Coal Gully series of the Nicola basin. The measures at this point rise to a height of 400 feet above the valley and have a general dip west of 40°. The various seams of coal outcrop near the top of the hill.

During 1925 there has been very little development-work done and operations have mostly been confined to the extraction of pillars. Some prospecting was done about a mile west of the present operations, by way of sapping and digging into the side of the hills, for the purpose of

proving the extension of the different seams. During the latter part the outcrop of what is thought to be No. 2 seam, which is the most important and probably the most successfully operated seam, was discovered at this point. The old No. 2 mine, which was worked out and finished quite a number of years ago, is in direct line with the surface croppings discovered. This seam is found in the upper or Coldwater series of the Nicola basin on the west side of the river, lying in the form of an anticline, at the apex of which the seam is found to be eroded. The outcrop which has been discovered is on the opposite side of the hill and is being developed by a level driven along the strike of the seam, which at this point has a general dip S.W. 45°. When last visited this level had been driven a distance of about 50 feet, a section of the seam being as follows: Roof; firm shale; top bench 5 feet of good coal; 3 inches fireclay; bottom bench 18 inches of good coal and shale floor. This level is about a mile west and at an elevation of 200 feet above the mine-tipple.

No. 4 MINE.

James Fairfoull, Overman; Robert Drybrough, Fireboss.

This is the largest and most extensive mine operated by this company and is developed by a well-maintained level entering the foot of the hill on the same elevation as the mine-tipple, and for a considerable way has been driven in the rock. Nos. 4, 5, 6, 8, and 9 seams have been penetrated by branch drifts cutting across the measures from the Main level. All the work above the Main level has been developed by means of headings driven through to the outcrop on the full pitch of the seams, which are about 5 feet thick and have an inclination of 30°. The coal is bituminous, of good quality, and overlain with a shale roof.

There has been very little development-work done in this mine during the past year and operations at present are confined to two small sections of the No. 6 seam. In the outside section pillars are being extracted and the working area is small and near the Main level and is finishing rapidly. The inside section of this seam is inside a fault and has been developed from the Main level by two headings driven on the full pitch of the seam for about 1,000 feet to the surface, which greatly improves the ventilation. Preparation is now being made to extract the pillars. The method of work adopted is the pillar-and-stall system. The openings made to the surface not only improve the ventilation, but facilitate the handling of the mine-timber for the workings. The coal is loaded at the various working-places into small dump-cars, trammed by hand to the main headings and dumped into the chutes, by means of which it is conveyed to the main No. 4 level and loaded into the usual mine-cars; these are drawn by mules to a landing, where they are collected into trips and hauled to the surface by main-and-tail-rope haulage. The coal is mined by hand and blasted when required by "permitted explosives," all shots being fired by electric detonators, under the supervision of certificated officials appointed for the purpose.

Ventilation is produced by a 8 by 5 double-inlet, Sheldon reversible fan, belt-driven by a 14 by 18 Ideal steam-engine, situated near the entrance to the mine. Owing to a difference of about 500 feet in elevation between the fan-drift and the openings at the outcrop, and the motive column created, natural ventilation greatly assists the mechanical ventilator.

When last visited there was passing into the mine 25,600 cubic feet of air a minute for the use of twenty-five men and three mules. Speed of fan, 120 r.p.m.; water-gauge, 0.7 inch. The doors, stoppings, and brattice were in good order and the air well conducted around the working-faces, which were free from any trace of explosive gas. Burrell gas-detector test, *nil*.

The working-faces were well timbered and a sufficient supply of suitable timber provided for the use of the workmen. The headings and bogie roads were well timbered and in fair condition. The incombustible matter in the dust on the roads of the pillar workings was 52.30 per cent. and moisture 8.30 per cent. The roads of the inside section and the No. 4 level were in good condition and, being naturally wet throughout, were free from any dust whatever.

No. 4 EAST MINE.

A. D. Allen, Overman; Thomas Rowbottom, Fireboss.

The entrance to this mine is situated 1,500 feet east of the entrance to the No. 4 mine and on the same elevation as the mine-tipple, and is operating on a portion of the No. 4 seam which could not be conveniently reached from the main No. 4 mine. It is developed by a pair of 15° slopes driven from the surface.

The measures are irregular and subject to a great deal of faulting and folding, causing some portions of the seam to attain an unusual thickness, while other portions are pinched out. The area of the mine is limited and all work confined to the extraction of pillars in close proximity to the slopes on the Nos. 5 and 6 West levels. Owing to the pitch and the irregularity of the seam, the coal is conveyed from the various places which are driven on the strike of the seam, by means of small mine-cars, and dumped into chutes which are built in the heading driven on the full pitch; from there it runs to the main levels and is loaded into the mine-cars, trammed by hand to landings situated near the Main slope, collected into six-car trips, and hauled to the surface by a direct-rope-haulage system operated by a steam-hoist.

Ventilation is produced by a small steam-driven double-inlet fan situated near the entrance to the counter-slope. When last visited there was passing into the mine 10,000 cubic feet of air a minute for the use of twenty-three men. The water-gauge registered 5 inches. Burrell gas-detector showed the return air to contain 0.1 per cent. methane. The working-places and roadways were well timbered and in fair condition and a sufficient supply of suitable timber provided for the use of the workmen. An analysis of the dust collected from the roads of this mine was as follows: Incombustible matter, 51.40; moisture, 4.90 per cent.

No. 5 East Mine.

Andrew McKendrick, Overman; Matthew McKibben, Fireboss.

This is a small mine situated 300 feet north of the entrance to the old No. 7 mine, abandoned, at an elevation of 350 feet above the mine-tipple and is operating on the top section of the No. 5 seam. It has been developed from the outcrop by a 10° slope following the pitch of the seam a distance of about 400 feet. The seam has an average thickness of 5 feet and is overlain with a fairly good shale roof.

All work consists of the extraction of pillars confined to a very limited area in close proximity to the slope. These pillars are being drawn on a retreat system back towards the outcrop. The mine-cars are loaded at the faces and trammed by hand to the slope, hauled to the surface by direct-rope haulage, operated by a compressed-air hoist situated near the entrance to the mine, gathered on a landing at the top of the slope, then hauled to a siding situated at the top of a gravity-incline and lowered to the tipple.

Ventilation is produced naturally and is ample for the use of four men. The air is well conducted around the working-faces and the brattice and stoppings are kept in good order. During the visits of inspection the mine has always been found free from any trace of explosive gas, the working-places and roadways well timbered, and a sufficient supply of suitable timber provided for the use of the workmen. The roadways are naturally damp and free from coal-dust.

No. 5 South Mine.

Andrew McKendrick, Overman; Matthew McKibben, Fireboss.

This mine is situated on the west side of Coal gully, near the northern boundary of the property of the Middlesboro Collieries, Limited. The seam being operated has not been definitely correlated, but is generally considered the No. 1 seam. The mine is developed by a well-maintained 8- by 12-foot level tunnel driven into the side of the hill. A short distance from the entrance the seam of coal is penetrated and is about 7 feet in thickness, with a general dip towards the gully of about 20°. Slopes have been driven off this level to the dip, a distance of about 300 feet, and a little pillar-and-stall work done. The seam is very irregular and faulted.

The Main level has been driven a distance of 700 feet from the entrance of the mine, and about 500 feet of rock-work has been done with the intention of proving the No. 1 seam of the inside of a fault which separates this portion of the property from the old No. 1 operations.

Ventilation measured showed 3,000 cubic feet of air a minute passing into this mine (produced naturally) for the use of fifteen men. The air was well conducted around the working-faces, which were free from any trace of explosive gas. Burrell gas-detector test failed to indicate any trace of methane. The working-places and roadways are well timbered and a sufficient supply of suitable timber provided for the use of the workmen. The roadways are naturally damp and free from coal-dust.

The loaded cars are hauled from the slope to the Main level by a direct-rope-haulage system, where they are collected at a landing, hauled by horses to the foot of a surface incline, at the

top of which is situated a hoist which draws the cars to the top of the incline, from which point they are lowered over a gravity-plane to the mine-tipple.

All coal at this colliery is hand-mined and blasted when required by "permitted explosives"; all shots are fired by electric detonators under the supervision of certificated officials appointed for the purpose. Edison electric safety-lamps are used by the workmen and flame-lamps of the Wolf locked type are used by the officials for inspection purposes.

The coal is loaded at the various mines into cars having a capacity of 1.5 tons and hauled to a tipple, which serves all the mines. It is dumped by a Phillips crossover dump; a switch-back and car-haul bringing the empty cars back, where they are collected and arranged into trips for dispatch to whichever mine they may be required. The power plant consists of four return-tubular boilers, having an aggregate of 600 horse-power. A Canadian Rand 2-stage cross-compound air-compressor, with a capacity of 2,000 cubic feet of free air a minute, is used for providing power for the mine-hoists, etc., and a 2,300-volt alternating generator is used for providing power for pumping and lighting purposes. No changes have been made at this plant during 1925.

Copies of the "Coal-mines Regulation Act," special rules, and plans of the mines are posted near the entrance.

The following are the official returns for the Middlesboro Colliery for the year ended December 31st, 1925:—

SALES AND OUTPUT FOR YEAR.	COAL.		COKE.	
(Tons of 2,240 lb.)	Tons.	Tons.	Tons.	Tons.
Sold for consumption in Canada	33,626			
" export to United States				
" " other countries				
Total sales		33,626		
Used in making coke				
" under colliery boilers, etc.	4,083			
Total for colliery use		4,083		
		37,709		
Stocks on hand first of year	380			
" last of year	357			
Difference taken from stock during year		23		
Output of colliery for year		37,686		

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, ETC.

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.
		$		$		
Supervision and clerical assistance	9		3		12	
Whites—Miners	46	5.00 to 8.00			46	
Miners' helpers	12	4.20			12	
Labourers	27	4.00 to 5.00	19	4.00 to 4.50	46	
Mechanics and skilled labour			10	4.25 to 5.50	10	
Boys			4	2.75	4	
Japanese						
Chinese						
Indians						
Totals	94		36		130	

Keystone Coal Co., Ltd.

F. R. Anderson, President, Vancouver, B.C.; C. W. St. John, Vice-President, Vancouver, B.C.; J. S. Salter, Secretary, Vancouver, B.C.; Jos. Graham, Superintendent, Merritt, B.C.

KEYSTONE COLLIERY.

John T. Brown, Manager; Richard Dunnigan, Fireboss.

This company is operating the property of the old Fleming Coal Company in the north-west portion of the Nicola coal-basin, which is situated 2 miles west and at an elevation of 500 feet above the city of Merritt. The measures in this portion of the coal-basin lie at a high angle of inclination pitching towards the west, the coal-seams outcropping on the surface.

During 1925 the work done by this company has consisted of driving a pair of slopes, dipping 30° from the outcrop in the No. 5 seam, a distance of 350 feet. Levels are driven off a limited distance on each side of the slope; the coal, while of an excellent quality, is found to be irregular, which has greatly retarded the work of development. These operations are small and operating on two shifts. Eight men are employed underground. The mine-cars are trammed by hand from the foot of the chutes to the slope, where they are hoisted to the surface by direct-rope haulage, a small steam-hoist and a 25-horse-power vertical boiler being used for this purpose. The cars are collected at the surface on a landing situated near the entrance to the mine and lowered in trips of six cars by tail-rope haulage a distance of about 2,000 feet to the top of a gravity-incline; then lowered a further distance of 2,000 feet over this gravity-plane to the tipple.

When last visited 2,500 cubic feet of air a minute was passing into this mine for the use of five men, the air being well conducted around the working-faces. There was no trace of methane. The working-places and roadways were well timbered and a sufficient supply of suitable timber provided for the used of the workmen. The roads, being naturally wet, were free from dangerous coal-dust.

The coal is of a friable nature and little blasting is required; "permitted explosives" are used and all shots fired with electric batteries under the supervision of certificated officials appointed for the purpose. There has been no change made with the surface plant during the year. Edison electric safety-lamps are used by the miners and flame safety-lamps of the Wolf type by the officials for inspection purposes.

The following are the official returns of the Keystone Colliery for the year ended December 31st, 1925:—

Sales and Output for Year.	Coal.		Coke.	
(Tons of 2,240 lb.)	Tons.	Tons.	Tons.	Tons.
Sold for consumption in Canada	5,665			
" export to United States				
" " other countries				
Total sales		5,665		
Used in making coke				
Used under colliery boilers, etc.	217			
Total for colliery use		217		
		5,882		
Stocks on hand first of year	35			
" last of year	80			
Difference added to stock during year		45		
Output of colliery for year		5,927		

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, ETC.

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.
		$		$		$
Supervision and clerical assistance	2	6.00	1	7.00	3	6.30
Whites—Miners	5	5.00			5	5.00
Miners' helpers	3	4.25			3	4.25
Labourers			3	4.00	3	4.00
Mechanics and skilled labour			2	4.75	2	4.75
Boys						
Japanese						
Chinese—Labourers						
Indians						
Totals	10		6		16	

Sunshine Coal Co., Ltd.

This is a small operation commenced during the present year and situated about 1 mile north of Merritt. Thomas Dobie and Smith and Fairley, local miners who have been engaged for some time prospecting in the north portion of the Nicola coal-basin, were successful in exposing the outcrop of a coal-seam on District Lot 180. The seam, which averages about 4 feet in thickness and dipping very rapidly, is of good commercial quality. A rock tunnel was driven into the side of the hill at a lower elevation than the coal-showings and encountered this seam of coal at a distance of about 50 feet, following the coal-seam a further distance of about 100 feet to the face. A raise is at present being driven to the surface, a distance of 30 feet, for ventilation purposes. The operation is small and all the work being done by the three miners who are the owners. The equipment in use consists of small mine-car and coal-bunker. The coal is taken away by teams and sold locally for domestic use.

This level was found to be well timbered and in good condition and naturally damp. The ventilation was fair, with no trace of methane. Locked safety-lamps of the Wolf type are used underground and all the coal is mined by hand and no blasting required. These operations are in charge of Thomas Dobie, who is a certificated fireboss.

The following are the official returns from the Sunshine Coal Company for the year ended December 31st, 1925:—

SALES AND OUTPUT FOR YEAR.	COAL.		COKE.	
(Tons of 2,240 lb.)	Tons.	Tons.	Tons.	Tons.
Sold for consumption in Canada	54			
" export to United States				
" " other countries				
Total sales		54		
Used in making coke				
Used under colliery boilers, etc.				
Total for colliery use				
Stocks on hand first of year				
" last of year				
Difference { added to / taken from } stock during year				
Output of colliery for year		54		

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, ETC.

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.
Supervision and clerical assistance						
Whites—Miners	3					
Miners' helpers						
Labourers						
Mechanics and skilled labour						
Boys						
Japanese						
Chinese—Miners						
Miners' helpers						
Totals	3					

Coalmont Collieries, Ltd.

W. J. Blake Wilson, President, Vancouver, B.C.; General J. W. Stewart, Vice-President, Vancouver, B.C.; A. H. Douglas, Secretary, Vancouver, B.C.; D. McLeod, Treasurer, Vancouver, B.C.

COALMONT COLLIERY.

Donald McLean, General Manager; George Murray, Manager.

This colliery is situated on the west bank of the North fork of Granite creek, 4½ miles by wagon-road from the town of Coalmont, which is situated on the Kettle Valley Railway, 12 miles west of Princeton.

The mines are at an elevation of 3,600 feet above sea-level, 2½ miles distant and 1,600 feet above Coalmont, where the tipple and screening plant is located. The coal is transported from the mine over the mountain to the tipple by means of an overhead tramway in buckets having a capacity of 1 ton. The coal-seams being operated at the present time are found exposed on the side of the mountain paralleling the North fork of the creek and are of unusual thickness, probably 160 feet, lying in the form of a synclinal basin. The basin is cut by a large dyke, mining east and west. Nos. 2 and 3 mines are operating in that portion of the field on the south side of the dyke and No. 4 mine, situated 5,400 feet west of the entrance to the No. 3 mine, is operating in the portion of the field north of the dyke.

No. 3 MINE.

George Murray, Overman; James Simm, John McMurtrie, and William Foster, Firebosses.

The entrance to this mine is situated on the same elevation as the top terminal of the overhead tramway. A well-maintained 8 by 12 level, known as the Wilson tunnel, starting from the outcrop, follows the strike of the seam a distance of about 3,000 feet. A barrier pillar 100 feet in thickness separates the workings of No. 3 mine from the old No. 2 mine, abandoned. With the exception of the counter-level, all the workings in this mine are to the dip of the Main level and have been developed by three main slopes, known as the Nos. 1, 2, and 3. The No. 2 slope, containing by far the largest and most important developments, has been driven a distance of 1,600 feet from the Main level.

Mining difficulties were found to greatly increase with depth, for not only the coal but the measures are much more friable, requiring the working-places to be timbered with heavy framed sets well lagged ahead of the last timbers. The roads contract quickly owing to the ground swelling, making it almost impossible to maintain them, with the result that development to the dip was abandoned and the extraction of pillars commenced. There have been no developments at this mine during the past year, all work being confined to the extraction of pillars. Unfortunately, during the month of March, a fire occurred at this mine, which necessitated

sealing the same until the month of August, when the mine was reopened and work concentrated upon the extraction of pillars at the inside of the Main level.

Ventilation is produced by a 7-foot double-inlet Sirocco fan, belt-driven by a 75-horse-power constant-speed motor, situated near the entrance to the counter-level and so arranged to be reversible if required. When last inspected there was passing into the mine 26,400 feet of air a minute for the use of fifteen men. A Burrell gas-detector test made in the return showed no methane present.

The working-places and roadways were found to be well timbered and a sufficient supply of suitable timber provided for the use of the workmen. The roads, being naturally damp, were free from dangerous coal-dust.

No. 4 MINE.

Joseph Thompson, Overman; John Maline, George Walker, Thomas Bysouth, William Ross, and Ben Cheetham, Firebosses.

The entrance of this mine is situated 5,400 feet west of the entrance of No. 3 mine and operating in the Coalmont field, lying on the west side of what locally is called the "Wilson fault," which separates the workings of this mine from those of the Nos. 2 and 3 mines. The seam dips into the hill at an angle of about 30° and has been developed by a 8 by 12 rock tunnel driven into the side of the hill some distance below the outcrop. The tunnel cuts across the measures and penetrates the seam at a distance of 300 feet from the portal. The seam is the same as that operated in No. 3 mine and has a thickness from 10 to 12 feet, maintaining its usual good quality. The measures at this point are fairly strong, making mining conditions favourable. This mine will no doubt develop into a large producer.

Headings have been driven from the Main level 400 feet distant from the entrance, following the seam on the full pitch to the outcrop, where a "booster" fan, manufactured by the American Blower Company, belt-driven by a 30-horse-power induction-motor, has been installed for ventilation purposes. The work being done at present is to the dip of the Main level. This area is being developed by a pair of slopes, which at the time when last visited had been driven a distance of 1,400 feet. These slopes for a considerable distance have been operating in a fine body of coal, free from faulting. Preparation has been made for the commencement of the Nos. 8 and 9 levels. No. 7 East and West levels are the lowest workings at the present time. The West levels contain the most important developments owing to the fact that they are heading away from the fault towards the "Collins Gulch" portion of this property, where surface indications are more favourable, the upper levels having reached a distance from the slope of about 1,200 feet.

The roads are well timbered with framed sets and are about 10 feet in width. Owing to the pitch of the seam the coal is conveyed from the working-faces by means of chutes, at the foot of which it is loaded into the mine-cars, which have a capacity of 1 ton, gathered by horse-haulage to landings situated near the Main slope, made into trips of four cars, and hauled up the slope to the Main level by direct-rope haulage. From the top of the slope the trips are hauled by horses to the top of a 30° surface incline, 800 feet in length, and lowered in six-car trips to a large siding, where the cars are collected into larger trips and hauled by a 15-ton steam-locomotive about 1¼ miles to the top terminal of the overhead tramway, situated at No. 3 mine.

During the last inspection there was passing into the mine 28,175 cubic feet of air a minute, divided into two splits. In the West side split there was passing 10,800 cubic feet of air a minute for the use of twenty men; in the East side split there was passing 17,375 cubic feet of air a minute for the use of twenty-six men. The working-places, roads, and airways were found to be free from any trace of explosive gas. Burrell gas-detector test showed no methane present. A good current of air was passing around the working-places and the brattice, stoppings, and doors were in fair condition. The working-places and roadways were well timbered and a sufficient supply of suitable timber provided for the use of the workmen. The roads, being naturally wet, were free from dangerous coal-dust.

During the early part of the year this mine was in the first stages of development, the largest portion of the output of the Coalmont Colliery was being mined from the pillars to the dip in No. 3 mine; however, sealing No. 3 mine during the month of March necessitated a vigorous policy of development at the No. 4 mine to keep up the output. To provide power for

the increased developments an electric hoist driven by a 200-horse-power rotor-wound induction-motor was installed at the top of the Main slope during the year, and an air-compressor driven by a 200-horse-power squirrel-cage induction-motor was installed at the surface near the mine to provide power for the air-hoists and mine-pumps. The power plant of this colliery, which is situated at Coalmont, 4 miles from the mine, was described fully in last year's report. The overhead tramway has again been operated successfully during the year. The buckets, which have a capacity of 1 ton, are the body of the mine-cars. They are attached to the carrier-arms of the tramways and are lowered and raised to the tramway by means of "air-lifts."

A large and commodious rooming-house is situated near the mine and is furnished to accommodate seventy-five men. This building is steam-heated and electric-lighted. All bedding and furnishings are provided by the company, to assure cleanliness and comfort for the employees. The rooming-house is connected by a covered passage-way to a large combined change and wash room, steam-heated and provided with shower-baths, wash-basins, lockers, and large lavatory, which includes every convenience. A dining-room comfortably furnished with steam heat and electric lights, provided for the accommodation of about 150 men, is situated at the mine. A well-appointed doctor's office and first-aid room is provided at the mine, supplied with hot and cold water and steam-heated. The doctor is in daily attendance and a first-aid man is in attendance night and day.

A mine-rescue station with a smoke-room is provided and has been used during the year in training employees for this class of work. The equipment consists of five sets of Gibbs self-contained breathing apparatus, a pulmotor, and charging-pump. A good supply of oxygen and regenerators is provided.

Edison electric safety-lamps are in use by all the employees underground at this colliery and safety-lamps of the Wolf type are used by the officials for inspection purposes. Explosives of the permitted class are used for blasting and all shots fired with electrical batteries under the supervision of certificated officials appointed for the purpose. Copies of the "Coal-mines Regulation Act" with special rules are posted near the entrance to the mines.

The following are the official returns from the Coalmont Colliery for the year ended December 31st, 1925:—

Sales and Output for Year.	Coal.		Coke.	
(Tons of 2,240 lb.)	Tons.	Tons.	Tons.	Tons.
Sold for consumption in Canada	110,229			
" export to United States	712			
" " other countries				
Total sales		110,941		
Used in making coke				
Used under colliery boilers, etc.	6,936			
Total for colliery use		6,936		
		117,877		
Stocks on hand first of year				
" last of year				
Difference { added to / taken from } stock during year				
Output of colliery for year		117,877		

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, ETC.

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage
		$		$		$
Supervision and clerical assistance	10	6.41	14	5.52	24	5.89
Whites—Miners	114	6.87	.....	.....	114	6.87
Miners' helpers	.....	.....	.....	.....	.....	.....
Labourers	51	4.80	79	4.22	130	4.33
Mechanics and skilled labour	1	5.20	24	4.87	25	4.88
Boys	4	3.62	3	3.08	7	3.40
Japanese	.....	.....	.....	.....	.....	.....
Chinese	.....	.....	1	2.75	1	2.75
Indians	.....	.....	.....	.....	.....	.....
Totals	180	6.17	121	4.33	301	5.43

Princeton-B.C. Colliery Co., Ltd.

Geo. E. Stringer, Chairman, London, England; R. B. Glover, Vice-Chairman, London, England; R. L. Taylor, Secretary, London, England; Francis Glover, Manager, Princeton, B.C.

NEW SHAFT MINE.

Allen Ford, Overman; Frank Lester and Robert Gourley, Firebosses.

This mine is situated in the town of Princeton, a short distance north of the Great Northern Railway bridge, and operating the No. 1 seam of this property on the north side of the river.

The development done is as follows: A small 7 by 9 vertical shaft lined with concrete has been sunk to the coal-seam, which is reached at a depth of about 93 feet, and pitching south at an angle of 12°. The upper 7 feet of the coal-seam only is worked, which is overlain by a shale roof. A landing has been made at the shaft-bottom and a level driven on a course N. 20° W. a distance of 238 feet. A pair of slopes following the full dip of the seam, which is S. 25° W., has been driven a distance of about 360 feet. From these slopes levels have been driven a short distance on each side. Unfortunately, with operations being so close to the river, there is a considerable seepage of water at the working-faces, making unsatisfactory working conditions for the miners, who generally have to protect themselves by wearing slickers and placing tin sheets above to run the water to the side of the place.

Ventilation is produced by a 6-foot fan of the Guibal type, driven by a 25-horse-power steam-engine. The shaft is divided into two compartments by a midwall, which is also continued along the level at the shaft-bottom to the entrance to the counter-slope. During the last inspection there was passing into the mine 6,000 cubic feet of air a minute for the use of thirteen men. Explosive gas was found in crosscut off No. 4 East level, which was fenced off, also a slight gas-cap at the face of No. 4 West level, the cause of which was operating these workings too far ahead of the last crosscut or the main ventilating-current of the mine.

This coal is used for domestic purposes and is mined by Post coal-cutting machines of the Hardy or Rand type. A minimum amount of explosives is used for breaking down the coal; permitted explosives only are used and all shots fired with electric batteries under the supervision of certificated officials appointed for this purpose.

The working-place and roadways were found to be well timbered and a sufficient supply of suitable timber provided for the use of the workmen. The roads, being naturally wet, were free from dangerous coal-dust. Edison electric mine-lamps are used by the workmen and flame safety-lamps of the Wolf type by the officials for inspection purposes.

During the year a large portion of the machine-shop equipment and the power plant had been brought from the old No. 1 and installed at these new developments, as follows: The mine-fan and steam-engine for driving the same; two return-tubular boilers having a combined capacity

of 150 horse-power and the Canadian Rand cross-compound air-compressor having a capacity of 750 cubic feet of free air a minute, used for furnishing power for the pumps, hoists, and mining-machines. A small single cage is used in this shaft; hoisting is done by a small fixed drum-hoist. A small mine-car having a capacity of 800 lb. is used in the mine. The screening plant is of a temporary character and consists of a small dump or hopper built at the top landing, into which the coal is dumped as it is taken from the mine. From the bottom of the hopper the coal is carried by a belt-conveyor to a small bar-screen situated near the boilers, where the slack coal is taken out for power purposes, and the larger size passing into a bunker is drawn off into a motor-truck and conveyed to railway-cars for shipment.

The following are the official returns from the Princeton Colliery for the year ended December 31st, 1925:—

Sales and Output for Year.	Coal.		Coke.	
(Tons of 2,240 lb.)	Tons.	Tons.	Tons.	Tons.
Sold for consumption in Canada	4,330			
" export to United States	112			
" " other countries				
Total sales		4,442		
Used in making coke				
Used under colliery boilers, etc.	2,608			
Total for colliery use		2,608		
		7,050		
Stocks on hand first of year	63			
" last of year	92			
Difference added to stock during year		29		
Output of colliery for year		7,079		

Number of Hands employed, Daily Wages paid, etc.

Character of Labour.	Underground.		Above Ground.		Totals.	
	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.
		$		$		$
Supervision and clerical assistance	3	5.50	1	5.50	4	5.50
Whites—Miners	7	5.25			7	5.25
Miners' helpers	8	4.00			8	4.00
Labourers	4	3.50	6	3.20	10	3.32
Mechanics and skilled labour	2	5.00	5	4.80	7	4.86
Boys						
Japanese						
Chinese						
Indians						
Totals	24	4.55	12	4.06	36	4.39

Tulameen Valley Coal Co.

Chas. A. Hunter, General Manager; Howell John, Overman.

This mine is situated about 2 miles west of Princeton and is accessible by a good wagon-road following the north bank of the Tulameen river. The mine is developed by three well timbered and maintained levels driven from the foot of the hill near the river and following the strike of the coal-seam. The coal is high-grade lignite and in good demand for domestic purposes. The

seam is about 24 feet in thickness, dipping east on an angle of 8°, and overlain by a fairly good shale roof. The upper 11 or 12 feet of the sea, which is good clean coal, is at present being operated. The measures are very conformable and no indication of faulting has been found. The Lower or Main level, which is situated near the foot of the hill and a little above the elevation of the river, has been driven a distance of 600 feet from the portal and the counter-level above a similar distance. Crosscuts have been put through, leaving pillars above 100 feet in length.

During the early part of the year a third level was commenced above the No. 2 level and leaving a pillar of about 100 feet. This level has been driven a distance of about 200 feet from the portal and two crosscuts driven connecting with the No. 2 level. This mine is well timbered throughout by heavy framed sets consisting of 10-foot collars and legs, which are well lagged and braced. Ventilation is produced naturally at present and is ample for the eight men employed. The working-places were well bratticed to the faces and no trace or indication of methane was found in this mine.

Wheat electric head-lamps are used by the workmen and flame safety-lamps of the Wolf type by the officials for inspection purposes. The coal is mined by hand and blasted when required by permitted explosives, all shots being fired with electric batteries under the supervision of a certificated official appointed for this purpose. The roads are well timbered and in good condition and, being naturally damp, are free from dangerous coal-dust. There is no mechanical power of any description used in these mining operations, all the development-work being above the Main or the No. 1 level. The coal is loaded into cars having a capacity of about 1 ton; these run by gravity from the working-faces to the surface, where they are dumped, the coal passing over a bar-screen, where it is cleaned and sized for the market.

The entrance to this mine is on the same elevation and situated about half a mile north of the main line of the Kettle Valley Railway. A spur holding three railway-cars has been built, also an elevated platform erected, provided with three loading-chutes, from which the coal is dumped into the railway-cars. A fairly good wagon-road has been made between the mine and the railway spur during the present year and motor-trucks are used for transporting the coal from the mine-screens to the coal-chutes at the railway. A coal-bunker has been erected at the entrance to the Upper or No. 3 level. A weighing-machine for weighing the coal on the motor-trucks, a blacksmith-shop, and cabins have been erected, making in all a fair amount of construction-work during the year.

This mine is operated by two miners named Charles Hunter and Benjamin Bowen, who were successful in uncovering this exposure during the year 1924.

The following are the official returns for the Tulameen Valley mine for the year ended December 31st, 1925:—

SALES AND OUTPUT FOR YEAR.	COAL.		COKE.	
(Tons of 2,240 lb.)	Tons.	Tons.	Tons.	Tons.
Sold for consumption in Canada	5,416			
" export to United States				
" " other countries				
Total sales		5,416		
Used in making coke				
Lost in preparation	1,405			
Total for colliery use		1,405		
		6,821		
Stocks on hand first of year	25			
" last of year	55			
Difference added to stock during year		30		
Output of colliery for year		6,851		

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, ETC.

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.
		$		$		$
Supervision and clerical assistance	1	6.50	1	8.00	2	7.25
Whites—Miners	10	6.00	.....	.....	10	6.00
Miners' helpers	.....	.....	.....	.....	.....	.....
Labourers	2	4.00	7	4.00	9	4.00
Mechanics and skilled labour	.....	.....	1	5.50	1	5.50
Boys	.....	.....	.....	.....	.....	.....
Japanese	.....	.....	.....	.....	.....	.....
Chinese	.....	.....	.....	.....	.....	.....
Indians	.....	.....	.....	.....	.....	.....
Totals	13	.....	9	.....	22	.....

EAST KOOTENAY INSPECTION DISTRICT.

REPORT BY ROBERT STRACHAN, SENIOR INSPECTOR.

I have the honour to submit my annual report covering the inspection of coal-mines, as provided for by the "Coal-mines Regulation Act," in the East Kootenay District during the year 1925.

This district is under the direct charge of John MacDonald, Inspector of Mines, with office in Fernie, and his report covering the general conditions in and around the mines, with a detailed description of the same, is attached.

The collieries in operation during the year were the Coal Creek and Michel, both operated by the Crow's Nest Pass Coal Company, Limited, with offices in Fernie, and Corbin Colliery, operated by the Corbin Coal, Limited, with offices in Spokane, Wash.

At Coal Creek four mines were producing coal during the year—No. 1 East, No. 1 South, Nos. 2 and 3—and No. 9 was reopened in early September and repair-work commenced.

At Michel two mines were producing coal, Nos. 3 and 8, while No. 3 East was maintained in a state of repair.

At Corbin two mines were producing, Nos. 4 and 6, although towards the latter end of the year production from No. 4 fell off considerably. Production was fairly steady at all the collieries, excepting for a few idle days during each month, due to lack of demand for coal.

The agreement formerly existing between the United Mine Workers of America and the Coal Operators' Association has been replaced by local agreements at each colliery between the employees and employers.

ACCIDENTS.

Thirteen accidents were reported to this office during the year as provided for by section 71 of the "Coal-mines Regulation Act," involving injuries to an equal number of the workmen. All of these accidents came under subsection (*b*) and no accidents under subsection (*a*), explosions of gas, powder, or steam-boilers.

It is with pleasure that I record the freedom from fatal accidents during 1925, the second time in the history of mining in the Crowsnest District, and especially coming so close after the same freedom in 1923, the only two years out of twenty-five that have been free from fatal accidents.

Seven of the accidents occurred in Coal Creek Colliery, five in Michel, and one at Corbin. The following table shows the colliery and the causes of the accidents:—

Colliery.	Haulage.	Timbering.	Falls of Coal.	Miscellaneous.	Total.
Coal Creek	3	2	2	..	7
Michel	5	..	..	..	5
Corbin	..	..	..	1	1
Totals	8	2	2	1	13

According to occupation, the accidents affected the following: Miners, 4; drivers, 3; timbermen, 1; brusher (rockman), 1; trapper, 1; rope-rider, 1; labourer, 1; jig-tender, 1.

Dealing with causes of accidents at Coal Creek, two miners injured by falls of coal at the working-face, which would indicate the necessity for more or better spragging of the coal there; one timberman injured through break-down of a temporary scaffold; one due to rope flying when attempting to haul out a timber; one driver injured while stepping off a trip in motion and a similar accident to a rope-rider; and a trapper injured by runaway trip smashing his door.

With the exception of the trapper, the other causes indicate want of more care on the part of the workman; in the case of the trapper, this was the only door in the mine where a refuge-hole was not provided behind the door, and in future this should be avoided.

At Michel two miners were injured; in one case while clearing the rail the driver took out the sprag, allowing the loaded car to run over the miner's hand, and seems to reflect the lack of care on the part of both; in the other the miner was lowering a loaded car when it bumped into another loaded car and the rebound broke his leg, which would seem to indicate that the miner did not have proper control of his car, or was apparently unaware of the other loaded car. Two drivers; in one case his glove caught on a loaded car. One of the trips being lifted out of the parting by a hoist; in this case more attention could be paid to maintaining the cars in a better state of repair, and both in building and repairing cars bolt ends should either be kept inside the car or made flush with the bolt. In the other case of the driver, his hand was caught between two draw-heads of the cars and more care on the part of the workman would avert such accidents.

The other case in Michel was of a labourer attempting to rerail a loaded timber-truck which was off the track on the incline, and in doing so with the assistance of the hoist it swung around and injured him. In such cases it is much safer to unload the truck and replace it on the track instead of depending on the hoistman, who has no knowledge of the conditions surrounding the accident.

At Corbin only one accident was reported; an outside employee was opening a drum of zinc-chloride solution when a portion flew out, burning him on the face and hands. The use of gloves, goggles, proper wrench, and a small protective device would easily avert such accident.

It is worth noting that at Corbin Colliery not a single accident has been recorded inside the mine for over five years and reflects a very high state of discipline and efficiency. A little more care on the part of the workmen, with stricter discipline and supervision, and especially a more careful attitude of mind, would go far to eliminate a great many of these accidents.

The general conditions of the mines with respect to ventilation are dealt with in detail by John MacDonald, Inspector for the district, in his report, which is attached, and shows the conditions existing as being fairly good.

In the No. 1 East mine the methane percentages in the air-currents have been fairly high during the year, and to some extent are due to many small outbursts of methane, in some cases so slight as not deemed worth recording. These accompany the mining or digging of the coal and contribute to easy mining so much desired by the miner. Differences between some of our reports on air samples as compared with Burrell gas-detector tests seem to be more due to the irregular flow of methane rather than any lack of care in taking samples or using the Burrell gas-detector. In this mine it is easy at any time to radically increase the percentage of methane in the air-current by simply breaking down the top coal, either intentionally or accidentally.

As in former years, full advantage has been taken of the facilities offered by the Dominion Department of Mines to have analyses made of the air-currents in the mine, and we are very much indebted to that Department for the analyses made, sample-bottles furnished, and mailing facilities afforded. The great distance these samples have to travel, necessitating a loss of time in receiving the results, detracts to some extent from their value, and it almost seems that means of dealing with them closer to the mines is desirable.

For the whole district 122 samples were taken, or twenty-six more than in the previous year, of which twenty-two were lost by accidents either in the laboratory or in transit, caps becoming loose, or breakage, or a loss of about 18 per cent. Of the samples taken, eighty-six came from Coal Creek Colliery, thirty-four from Michel Colliery, and two from Corbin Colliery. For the purpose of determining more accurately the actual methane conditions or contents of the air-currents eighty-four samples were taken, and thirty-eight for special purposes, to determine conditions in and around caves, fire areas, bumps, and blow-outs of methane.

Dealing with the mines at Coal Creek, we have an increase in the methane percentage in all the splits in the No. 1 East mine as compared with 1924. In the main return this shows an increase of from 0.89 to 1.05 per cent.; the No. 1 South split, which is situated in the portion of the mine subject to blow-outs and bumps, shows an increase from 1.68 to 1.80 per cent., while in one case the analysis showed 2.53 per cent. In the No. 2 South split in this mine the highest average increase in methane percentage is recorded—namely, 0.28—while the highest amount recorded during the year shows 1.71 per cent.

In considering these two districts in the No. 1 East mine, it must be taken into consideration that these include all the principal areas in which blow-outs of methane and dust have been met with during 1925.

Taking first the No. 1 South split in No. 1 East mine, there is an increase in the amount of air being circulated of about 25 per cent., while the methane production has increased 36 per cent. In the No. 2 South split in this mine the increase in air circulated amounts to 29 per cent., while the methane production increased 62 per cent. In the North split, No. 1 East, there is an increase of 26 per cent. in the air circulated, while the methane contents of the air-current has increased 2 per cent. In the West split the air-current shows a decrease of 20 per cent., while the methane contents have increased 24 per cent.

In the No. 3 mine at Coal Creek the main return and both the splits show an increase in methane, as well as in the amount of air circulated. In the main return the air increase shows 30 per cent., while the methane increases 17 per cent. The Incline split shows an increase of air amounting to 27 per cent., while the methane increases 72 per cent. In the South or Slope split the air circulated shows an increase of 11 per cent., while the methane shows an increase of 62 per cent.

In the No. 2 mine the main return shows an increase in ventilation of 5 per cent., while the methane increase amounts to 52 per cent. In the No. 1 South mine the main return shows an increase of 52 per cent. in the amount of air circulated, while the methane shows an increase of 84 per cent. In the No. 1 split the amount of air circulated shows a decrease of 30 per cent., while the methane shows an increase of 125 per cent. The No. 2 split shows a decrease of 32 per cent. in the amount of air circulated, while the methane shows only an increase of 1 per cent.

At Michel Colliery the methane production has not been very excessive during the year; in the No. 3 East mine, where no coal has been produced for several years, the mine being maintained in repair with an idea of draining the methane off the adjoining mine, No. 3, there has been a reduction, and none of the airways shows above 0.83 per cent. In the No. 3 mine the main return shows an increase of 0.04 and the average shows 0.65 per cent. Out of five splits in this mine only two show 1 or above 1 per cent.—namely, No. 1 North split with 1.04 and No. 1 split with 1 per cent. In the No. 8 mine all the airways show a decrease, the highest showing 0.22 per cent. At Corbin Colliery the methane percentage is very low, being 0.15 in No. 4 mine, with 0.14 per cent. in the No. 6 mine.

COAL-DUST.

The conditions with regard to the presence of coal-dust have been kept fairly good at all the mines during the year and it is very important that this work should be maintained and improved on. With the introduction of the new regulations for precaution against coal-dust an impetus has been given to the use of non-combustible dust, and consequently with a reduction in the amount of water used for this purpose. This reduction in the use of water is reflected in our tests for humidity, which has fallen to some extent.

As in previous years, the dust used as non-combustible has been to some extent flue-dust from the boilers, but tests have been made with several other kinds, some of which have proved satisfactory. The principal objection to some of the dusts tried has been the high percentage of free silica, which is objectionable owing to its injurious effect on the lungs of the workmen. The same objection applies to the dust from the boilers and fine second-burnt ashes.

Four samples of non-combustible dusts have been sent to Victoria for analysis, but so far only two returns have been made. The first sample was a very fine sand, fairly well rounded with but few sharp particles; 50 per cent. of this sample was retained on a 150-mesh screen; therefore it does not come up to the test. It also showed 50 per cent. of free silica, which is objectionable. The second sample was a very fine clay, with well-rounded grains, while the free-silica contents were well under 25 per cent. In fineness it showed 75 per cent. as passing 200-mesh screen.

According to this analysis the first material is not suitable for treating the coal-dust, while the second is very satisfactory. One objection to the latter is its tendency to absorb moisture and dry out the ventilating-current. This objection is still more evident in the case of non-combustible dust barriers, as it tends to cake, and the first would prove more suitable for barriers if it could be found or made sufficiently fine to pass through the fineness test. Cars for distributing the dust by blowing it into the air with compressed air are used on all main roadways, while on other roads and close up to the working-face the dust is distributed by hand.

Water as a means of reducing the dust danger is still used to some extent on the roadways close to the working-faces, but every indication points to the replacement of water by dust. Corbin Colliery is the only one not using dust to any extent and here the conditions are naturally wet. As the workings penetrate farther from the outside, conditions will probably change in this respect and means of dealing with the dust danger will have to be adopted.

It is again desired to draw the attention of the management at all the collieries to the condition of the mine-cars; unfortunately many of those built of timber afford too many means of escape for the very fine coal-dust, the most dangerous dust, and this can easily be avoided by using greater care in building the cars and during the reconstruction and maintenance of these.

BUMPS AND BLOW-OUTS.

During 1925, as provided by section 71, subsections (*c*) to (*h*), chapter 171 of the "Revised Statutes of British Columbia, 1924," notices of dangerous occurrences to the extent of thirteen were received at this office.

These include ten blow-outs, two bumps, and one of caving, all of which occurred in the mines of the Coal Creek Colliery. The ten blow-outs all occurred in the No. 1 East mine; one bump also occurred in this mine, the other in the No. 3 mine, while the cave occurred in the No. 1 South mine. Of the ten blow-outs, four liberated and discharged into the mine air-current a considerable amount of fine coal in addition to the methane.

Under these conditions it is a tribute to the supervision of the officials and the alertness of the workmen that there are no fatal or serious accidents to record from this cause. Both the bumps in No. 1 East and No. 3 mine are recorded as severe, but, similar to the blow-outs, no accidents were reported as connected with them.

While differences of opinion may exist as to the cause of bumps, there exists no doubt but that the great weight of the overhead strata is one, if not the principal, cause of bumps. The size of the pillars left as a support to the overhead strata determines to a great extent the severity of the bump. In the case of the No. 1 East mine the strata amount to about 2,300 feet, or equivalent to a weight of almost 180 tons resting on each square foot of the coal-seam. In the case of No. 3 mine the strata amount to 2,450 feet, or equivalent to about 190 tons resting on each square foot of the coal-seam.

While the extraction of coal is small in these mines and very little, if any, attempt made at present to extract pillars, this small extraction adds considerably to the weight resting on the pillars left as a support. Some authorities claim that at depths of 1,500 feet or over it is almost impossible to resist the crushing effect due to this weight of strata, with any reasonable extraction of coal. That the effects of this bumping has not been so severe since 1921 is due, it is considered, to the increase in the size of the pillars left as a support, and it is also noticeable that the production of methane during this same period has not been so great as in the previous three years, and would lead to the idea that there was less crushing or squeezing on the seam and less coal-surface exposed.

Taking the years as follows: 1918, 5,389 cubic feet of methane per ton of coal mined; 1919, 4,925 cubic feet; 1920, 6,192 cubic feet; 1921, 2,680 cubic feet; 1922, 1,815 cubic feet; 1923, 2,713 cubic feet; 1924, 2,713 cubic feet; 1925, 3,076 cubic feet. While periods of idleness during the year will affect this production of methane per ton of coal mined, the constant reduction of the quantity is to some extent, it is thought, due to the reduction in crushing or squeezing and the reduced area of coal exposed.

The other dangerous occurrence reported was a large cave on the main return airway in No. 1 South mine, cutting off the ventilation and requiring all the workmen to be withdrawn from the mine.

Advantage was taken by the workmen of section 71, Rule 37, "Coal-mines Regulation Act," at all the collieries during the year and thanks are due to them for so doing. This inspection

is of great assistance to the officials, to ourselves, and to the workmen in maintaining safer conditions in and around the collieries.

At Coal Creek Colliery inspection was made in No. 1 East mine nineteen times, in No. 3 and No. 1 South thirteen times, and in No. 2 twelve times. At Michel Colliery inspection was made twelve times in each mine working, or once per month, and at Corbin the inspection was made eleven times during the year.

Five prosecutions were made during the year and these were all at Michel. All were for breach of Special Rule 114, failure to sprag the coal at the working-face. Sixteen searches for matches, pipes, or other articles contrary to the provisions of the "Coal-mines Regulation Act" were made during the year—eight at Coal Creek, six at Michel, and two at Corbin—and no articles were found of such character.

Haulage inside the mines is generally of some form driven by compressed air, self-acting inclines, compressed-air locomotives, or horses. In some cases the hoist is situated outside the mine and driven by steam. Horses are used for gathering the loaded car from the working-faces and delivering the empty cars to the faces. All horses are brought outside at the end of the shift and are very well cared for both inside and outside the mine.

All the workmen engaged inside the mines use the Edison electric mine safety-lamp of the cap type, while the officials generally use the Wolf safety-lamp as a means of making a rapid determination of the mine air with respect to the presence of methane. The Burrell gas-detector is in use at all the mines for determining lower percentages of methane than can ordinarily be determined with the safety-lamp as required by section 71, Rule 4. Barometers, thermometers, extracts of the general rules and the special rules, as well as the "systematic method of timbering" notices are all kept posted near the mine entrances and are kept in fairly good condition.

No explosives are used in the production of coal at Coal Creek Colliery, and while the use of explosives for the production of coal is permitted at Michel and Corbin, it should be distinctly understood that every precaution must be taken to prevent accidents.

Strict attention should be paid as to the presence of methane, coal-dust, and the placing of the shot. Where blasting of rock has taken place in close proximity to the proposed placing of a shot in coal, close examination should be made as to the existence of breaks in the rock where methane may exist, impossible to test for, and in case of doubt safety should be the first consideration and no shot fired. Attention is also drawn to the fact that in no case should a second hole be drilled until the first has been blasted, and it should always be kept in mind that it is very difficult to accurately determine the position of a second drill-hole until it is known what work the first shot has accomplished.

MINE-RESCUE AND FIRST AID TO THE INJURED.

During the year first-aid-to-the-injured work was fairly active at Michel and Corbin Collieries, while very quiet at Coal Creek. In this work twelve men took a course of training at Fernie, but no classes were carried on at Coal Creek.

At Michel Colliery there are seventy holders of certificates under the St. John Ambulance Association and a class of sixty-five was in training at the end of the year. At Corbin twelve men took a course of training in first aid to the injured. Many other workmen and officials hold certificates in this work, but it is always better for such to renew their training and knowledge and so keep up with the best practices.

In mine-rescue work seven workmen at Coal Creek took a course of training and thirteen took a course of retraining during the year. At Michel Colliery fourteen workmen took a course of retraining during the year, while at Corbin six took a course of training and two took a course of retraining. The East Kootenay Mine Safety Association held a first-aid and mine-rescue competition at Fernie on August 1st, when six teams took part in the first-aid contest and five in the mine-rescue events. Three of these teams represented Coal Creek Colliery, two represented Michel, while no teams were entered from Corbin either in the mine-rescue or first aid. In the first-aid work there were four teams from Coal Creek and two from Michel.

The winning team in the East Kootenay Mine Safety Association mine-rescue event from Coal Creek, captained by John Caufield, later took part in the contest held under the Vancouver Island Mine Safety Association and took first place there, practically making them the champions of British Columbia.

The mine-rescue apparatus at all the collieries and the Government Station at Fernie is of the Gibbs type and has been maintained in a fairly good condition.

The following table shows the amount of apparatus in the district:—

Colliery or Station.	Number.	Kind.	Pulmotors.
Coal Creek	6	Gibbs.	1
Michel	6	"	1
Corbin	5	"	1
Fernie	6	"	2
Totals	23	..	5

With twenty-three mine-rescue apparatus in the district, this is sufficient to provide for any emergency that may arise, provided that all the collieries co-operate, and this desirable end has been greatly advanced through the endeavours of the East Kootenay Mine Safety Association.

The mine-safety and first-aid competition held under the East Kootenay Mine Safety Association was very successful, and no competition was held in Southern Alberta for the past two years. The East Kootenay Mine Safety Association has played an important part in providing greater measures of safety in and around our mines, and so far the principal support has been from the coal companies and the Department of Mines. It seems rather disappointing that so few of the workmen take an active interest in the association and thanks are due to those who have given of their time and labour.

In addition to regular duties of inspection, assistance was given at the two examinations for colliery officials held in this district, also the regular examinations for coal-miners' certificates, and sixty-five provisional certificates were granted during the year.

It is again desired to thank the workmen and officials for their assistance and support in carrying out the inspection duties during 1925, and look forward for a continuation of the same during 1926, realizing more and more that it is only through the co-operation of all parties that a reduction in our list of accidents can be expected and so make the industry of mining a safer and more pleasant occupation.

Attached is the report of John MacDonald, Inspector of Mines, with detailed description of the various mines, with the conditions prevailing in and around the same, and the annual returns as required by section 66 of the "Coal-mines Regulation Act" from the collieries for the year 1925.

REPORT BY JOHN MACDONALD, INSPECTOR.

Crow's Nest Pass Coal Co., Ltd.

Head Office—Fernie, B.C.

Capital, $3,500,000.

W. R. Wilson, President and General Manager, Fernie, B.C.; A. H. McNeill, K.C., Vice-President, Vancouver, B.C.; J. S. Irvine, Secretary, Fernie, B.C.; A. A. Klauer, Treasurer, Fernie, B.C.

The above company operated during 1925 the Coal Creek and Michel Collieries on the western slope of the Rocky mountains in the East Kootenay Inspection District.

Coal Creek Colliery is situated at Coal Creek, about 5 miles from the town of Fernie. Railway connection from the colliery is made with the Canadian Pacific Railway and the Great Northern Railway at Fernie by the Morrissey, Fernie & Michel Railway.

Michel Colliery is situated on both sides of Michel creek, on the Crowsnest branch of the Canadian Pacific Railway, about 24 miles in a north-easterly direction from Fernie.

The following are the aggregate returns from the Crow's Nest Pass Coal Company's mines for the year 1925:—

Sales and Output for Year.	Coal.		Coke.	
(Tons of 2,240 lb.)	Tons.	Tons.	Tons.	Tons.
Sold for consumption in Canada	394,535		53,153	
" export to United States	224,442		21,936	
" " other countries				
Total sales		618,977		75,089
Used in making coke	115,770			
Used under colliery boilers, etc	45,537			
Total for colliery use		161,307		
		780,284		
Stocks on hand first of year	397		410	
" last of year	5,781		506	
Difference added to stock during year		5,384		96
Output of colliery for year		785,668		75,185

Number of Hands employed, Daily Wages paid, etc.

Character of Labour.	Underground.		Above Ground.		Totals.	
	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.
Supervision and clerical assistance	36		22		58	
Whites—Miners	470				470	
Miners' helpers						
Labourers	84		202		286	
Mechanics and skilled labour	293		186		479	
Boys	28		17		45	
Japanese						
Chinese			4		4	
Indians						
Totals	911		431		1,342	

COAL CREEK COLLIERY.

B. Caufield, Manager; J. Taylor, Assistant Manager; M. Morrison, Safety Inspector.

This colliery is situated on both sides of Coal creek and has railway connection with the Canadian Pacific and Great Northern Railways at Fernie by means of a branch line, 5 miles in length, called the Morrissey, Fernie & Michel Railway.

The mines operated during the year were No. 1 East, No. 3, No. 2, and No. 1 South on the south side of the valley, while the only one operated on the north side was No. 9 mine, operations being resumed in the early part of September after a stoppage of work dating from March 31st, 1924. A general description of the methods of work, systems of haulage in and around the mines, and surface plant has appeared in previous Annual Reports of the Minister of Mines; no additions have been made to the surface plant during the year.

The lamp used exclusively by the workmen is the Edison electric cap safety-lamp, while Wolf safety-lamps are used by the officials and bratticemen for testing purposes, all lamps being cleaned and repaired in a well-equipped lamp-room located in a central position at the colliery.

Burrell gas-detectors are provided at all the mines for the purpose of detecting lower percentages of methane than that usually found by the ordinary safety-lamp.

A large number of houses are provided at Coal Creek for the convenience of those who prefer living close to the mines, while a good train service is maintained with the town of Fernie, where the majority of the workmen reside.

Copies of the "Coal-mines Regulation Act" and special rules are posted up at all the mines. Following is a brief description of the conditions prevailing in the mines throughout the year:—

No. 1 EAST MINE.

J. Caufield, Overman; J. Duncan, T. Reid, J. Maltman, E. Rutledge, and R. Fowler, Firebosses.

This mine operates the eastern portion of the No. 1 seam, the seam being reached by a crosscut tunnel at a distance of 215 feet from the surface. It is ventilated by an electrically driven 11- by 10-foot Sirocco fan, which, running at a speed of 174 revolutions a minute, produced an average quantity of 118,300 cubic feet of air a minute, under a water-gauge of 3.6 inches.

Ventilation is divided into four splits, the quantities passing in each at the last inspection measuring as follows:—Tunnel split: 14,000 cubic feet of air a minute for the use of thirty men and five horses; Burrell gas-detector, 0.6 per cent. methane. First South split: 33,600 cubic feet of air a minute for the use of forty men and three horses; Burrell gas-detector, 1.6 per cent. methane. Second South split: 21,600 cubic feet of air a minute for the use of twenty-five men and four horses; Burrell gas-detector, 1.5 per cent. methane. North split: 20,800 cubic feet of air a minute for the use of twenty-five men and four horses; Burrell gas-detector, 1.1 per cent. methane. North return: 108,000 cubic feet of air a minute for the use of ninety men and eleven horses; Burrell gas-detector, 1 per cent. methane. East side of shaft: 44,000 cubic feet of air a minute. West side of shaft: 93,000 cubic feet of air a minute. Total return air: 137,000 cubic feet of air a minute.

Explosive gas has been found a number of times in the course of inspection, mostly in cavities in the roof, while Burrell readings taken in the return air-currents have varied from 0.5 per cent. in the Tunnel split to 2 per cent. methane in the First South split. Roadways and timbering have been kept in fairly good shape, a good supply of timber provided for the use of the workmen, and the requirements of the "special timbering" rules fairly well complied with at the working-faces. Spraying systems are operated on all roads and working-places where required, while all main roads are treated with second-burnt ashes and other incombustible dust. Sixteen samples of dust have been taken in this mine in conformity with Regulation No. 4 of the Coal-dust Regulations, the resultant analysis proving them to contain over 50 per cent. incombustible matter.

No. 1 SOUTH MINE.

F. Landers, Overman; W. Hynds, W. Stockwell, W. Morgan, and M. Hilton, Firebosses.

This mine operates the upper and western portion of the No. 1 seam and is ventilated by an electrically driven 8- by 4-foot Keith fan, which, running at a speed of 254 revolutions a minute, produced an average of 44,700 cubic feet of air a minute, under a water-gauge of 2.6 inches.

The ventilation is divided into two splits; the quantities passing in each at the last inspection measured as follows:—No. 1 split: 17,400 cubic feet of air a minute for the use of thirty-six men and nine horses; Burrell gas-detector, 1.5 per cent. methane. No. 2 split: 12,600 cubic feet of air a minute for the use of thirty-four men and seven horses; Burrell gas-detector, 0.6 per cent. methane. Main return: 48,500 cubic feet of air a minute for the use of seventy men and sixteen horses; Burrell gas-detector, 0.9 per cent. methane.

Explosive gas has been found nine times during the year in the course of inspection, in most cases in cavities in the roof, while Burrell readings taken in the return air-currents have varied from 0.4 per cent. in No. 2 split to 1.7 per cent. methane in No. 1 split. Roadways and timbering have been kept in fairly good shape, a good supply of timber provided for the use of the workmen, and the requirements of the "special timbering" rules fairly well complied with at the working-faces. Spraying systems are operated on all roads and working-faces where required, while the main haulage-roads are treated with second-burnt ashes and other incombustible dust. Fourteen samples of dust have been taken in compliance with Regulation No. 4 of the Coal-dust Regulations; these, with one exception, have all contained more than 50 per cent. incombustible matter.

No. 3 Mine.

J. Biggs, Overman; R. Phillips, E. Caufield, and W. Brown, Firebosses.

This mine operates the eastern and dip portion of the No. 2 seam and is ventilated by a 16- by 8-foot Wilson fan, which, running at a speed of 150 revolutions a minute, produced an average quantity of 62,000 cubic feet of air a minute, under a water-gauge of 4.4 inches.

The ventilation is divided into two splits; the quantities passing in each at the last inspection measured as follows:—Incline split: 11,500 cubic feet of air a minute for the use of eight men and two horses; Burrell gas-detector, 0.9 per cent. methane. Slope split: 37,500 cubic feet of air a minute for the use of forty-five men and seven horses; no Burrell gas-detector reading taken; safety lamp indicated 1.5 per cent. methane. Main return: 68,400 cubic feet of air a minute for the use of fifty-three men and nine horses.

Explosive gas has been found on three occasions in the course of inspection, while the percentage of methane in the return air-currents, as determined by the Burrell gas-detector, has varied from 0.4 per cent. in the Incline split to 1.9 per cent. in the Slope split. Roadways and timbering have been kept in good shape, a good supply of timber provided for the use of the workmen, and the requirements of the "special timbering" rules well attended to at the working-faces. Spraying systems are operated on all roads and working-faces where required, while the main roads are treated with second-burnt ashes and other incombustible dust. Sixteen samples of dust have been taken in compliance with Regulation No. 4 of the Coal-dust Regulations, all of which contained more than 50 per cent. incombustible matter.

No. 2 Mine.

C. McNay, Overman; J. Bushell, W. Clarkstone, and E. Ward, Firebosses.

This mine is situated on the same level as the tipple and operates the upper and western portion of the No. 2 seam. It is ventilated by a 16- by 8-foot Wilson fan, which, running at a speed of 136 revolutions a minute, produced an average quantity of 36,200 cubic feet of air a minute, under a water-gauge of 3.3 inches.

The ventilation was formerly divided into two splits, but during the latter part of the year it became necessary to put it all on one split for the time being, the quantity of air passing at the last inspection measuring as follows:—Main return: 37,100 cubic feet of air a minute for the use of fifty-four men and nine horses. No Burrell reading taken, but a very slight trace of methane was travelling in the air as indicated by the safety-lamp.

Explosive gas was found six times in the course of inspection, while the percentage of methane in the return air-currents, as determined by the Burrell gas-detector, varied from 0.3 per cent. in the High Line split to 1.3 per cent. in the Rock Tunnel split. Roadways and timbering have been kept in good shape, a good supply of timber provided for the use of the workmen, and the requirements of the "special timbering" rules fairly well attended to at the working-faces. Spraying systems are operated on all roads and working-places where required, while the main haulage-roads are treated with second-burnt ashes and other incombustible dust. Fourteen samples of dust have been taken in compliance with Regulation No. 4 of the Coal-dust Regulations, all of which have assayed well over 50 per cent. incombustible matter.

No. 9 Mine.

J. Worthington, Overman.

This mine resumed operations in the early part of September after a stoppage of work dating from March 31st, 1924. Since reopening every effort has been concentrated on repairing the main haulage-road, which was badly caved in places. Good progress has been made and this operation should be completed in the near future.

Ventilation is produced by a fan of the Guibal type, which at the last inspection produced 6,000 cubic feet of air a minute for the use of four men and one horse. No explosive gas was found in the course of inspection and conditions generally have been good.

The following are the official returns from the Coal Creek Colliery for the year ended December 31st, 1925:—

SALES AND OUTPUT FOR YEAR.	COAL.		COKE.	
(Total of 2,240 lb.)	Tons.	Tons.	Tons.	Tons.
Sold for consumption in Canada	159,641		28,761	
" export to United States	223,209			
" " other countries				
Total sales		382,850		28,761
Used in making coke,	46,053			
Used under colliery boilers, etc.	30,136			
Total for colliery use		76,189		
		459,039		
Stocks on hand first of year	397			
" last of year	5,491		89	
Difference added from stock during year		5,094		89
Output of colliery for year		464,133		28,850

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, ETC. (INCLUDING FERNIE OVENS.)

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.
Supervision and clerical assistance	21		13		34	
Whites—Miners	285				285	
Miners' helpers						
Labourers	51		76		127	
Mechanics and skilled labour	180		118		298	
Boys	12		4		16	
Japanese						
Chinese—Labourers						
Indians						
Totals	549		211		760	

MICHEL COLLIERY.

R. Bonar, Manager; Jonathan Henney, Safety Inspector; M. McLean Afternoon-shift Overman.

This colliery is situated on Michel creek, 24 miles north-east of Fernie, and has railway connections with both the Canadian Pacific and Great Northern Railways. A general description of the method of working, system of haulage in and around the mines, and surface plant has appeared in previous Annual Reports of the Minister of Mines.

Important additions to the surface plant during 1925 are as follows: A new machine-shop, 88 by 53 feet, has been built; this consists of reinforced-concrete pillars supporting roof-girders and built in between with brickwork. The floor consists of 6 inches of concrete, overlaid with wood blocks 5 inches square, the seams being filled with pitch. This building is heated by the Dunham system, connected with twelve large radiators, each having 200 square feet of heating surface. At the time of writing preparations are under way for the installation of machinery and equipment. When this is completed this building should be one of the finest colliery machine-shops in the interior. A new and commodious office building has also been erected, consisting of two stories, built entirely of stone and brick panelling, giving accommodation for the accounting and engineering staffs, paymaster's office, time-keeper's office, manager's office, store-room, and

visitor's living quarters; also fairly large lecture-hall where first-aid classes will hold their meetings in future; the whole being heated by the Dunham radiator system, having 1,200 square feet of heating surface.

A new electric drive has been installed at No. 8 mine fan, consisting of one 100-horse-power C.G.E. induction-motor, Type 1, Form R, 60 cycles, 2,200 volts, 25 amperes, 600 r.p.m., automatically equipped. This is in addition to the present compressed-air equipment.

As in 1924, the whole of the output at this colliery has come from Nos. 3 and 8 mines, nothing being done in the No. 3 East mine except repairs to main roads and attending to the pumps. The Edison electric cap safety-lamp is used exclusively by the workmen, while Wolf safety-lamps are used by the officials and bratticemen for testing purposes; all lamps being cleaned and repaired in a well-equipped lamp-room located in a central position at the colliery.

Copies of the "Coal-mines Regulation Act" and special rules are posted up at all the mines. Following is a brief description of the conditions prevailing in the various mines during 1925:—

No. 3 MINE.

M. Littler, Overman; J. Strachan, T. Owen, A. Ball, and O. Winstanley, Firebosses; R. Littler and T. Parkinson, Shotfirers.

This mine operates three seams, Upper No. 3, No. 2, and No. 1; a crosscut tunnel 200 feet in length connects Upper No. 3 and No. 2 seams, while a short crosscut tunnel connects Nos. 2 and 1 seams. The principal work done in the two latter has been confined to driving the main levels and making connections for ventilation purposes. Ventilation is produced by a 12- by 6-foot Sullivan fan, which, running at a speed of 148 revolutions a minute, produced an average quantity of 102,400 cubic feet of air a minute, under a water-gauge of 2.6 inches.

This mine is divided into five splits, the quantities passing in each at the last inspection measuring as follows:—No. 1 North split: 13,440 cubic feet of air a minute for the use of twenty-one men and two horses; Burrell gas-detector, 0.45 per cent. methane. Slope split: 36,000 cubic feet of air a minute for the use of fifteen men and three horses. No. 6 Slope split: 9,450 cubic feet of air a minute for the use of nine men and one horse. No. 6 Incline split: 8,800 cubic feet of air a minute for the use of twenty-three men and six horses. No. 4 Incline split: 9,240 cubic feet of air a minute for the use of twenty-five men and seven horses. Main return: 110,000 cubic feet of air a minute for the use of 105 men and ten horses.

Explosive gas was found twelve times in the course of inspection, while the percentage of methane in the return air-currents, as determined by the Burrell gas-detector, varied from 0.2 per cent. in the No. 6 Incline split to 2 per cent. in the No. 1 North split. Roadways and timbering have been kept in fairly good shape, a good supply of timber provided for the use of the workmen, and the requirements of the "systematic timbering" rules fairly well attended to at the working-faces. Spraying systems are operated on all roads and working-faces where necessary, while the main haulage-roads are treated with incombustible dust. Thirty-eight samples of dust have been taken in accordance with Regulation No. 4 of the Coal-dust Regulations, none of which came up to the requirements of the above *re* incombustible matter or moisture content. This matter is receiving attention and every effort is being made to treat the roadways so as to have them conform to the regulations.

No. 8 MINE.

C. Stubbs, Overman; E. Ainsworth, A. Almond, R. McFegan, R. Taylor, and R. Beard, Firebosses.

This mine operates the upper portion of the No. 8 seam and is ventilated by an 8- by 3½-foot double-inlet Jeffrey fan, which, running at a speed of 170 revolutions a minute, produced an average quantity of 84,450 cubic feet of air a minute, under a water-gauge of 1.7 inches.

The ventilation is divided into two splits, the quantities passing in each at the last inspection measuring as follows:—No. 1 split: 20,900 cubic feet of air a minute for the use of sixty-four men and fourteen horses. No. 2 split: 13,125 cubic feet of air a minute for the use of sixty-two men and twelve horses. Main return: 53,000 cubic feet of air a minute for the use of 126 men and twenty-six horses.

Explosive gas has been found once in the course of inspection, while the percentage of methane in the return air-currents, as determined by the Burrell gas-detector, has never exceeded 0.5 per cent. Roadways and timbering have been kept in good shape, a good supply of timber provided for the use of the workmen, and the requirements of the "systematic timbering" rules

well attended to at the working-faces. Spraying systems are operated on all roads and working-faces where required, while the main haulage-roads are treated with incombustible dust. Forty samples of dust have been taken in accordance with Regulation No. 4 of the Coal-dust Regulations, only six of which have assayed over 50 per cent. incombustible matter.

No. 8 PROSPECT.

C. Stubbs, Overman; W. McKay, Shotfirer.

This is a prospect-drift located about half a mile west of the entrance to No. 8 mine and is being driven for the purpose of proving the No. 7 seam, the seam being reached at a distance of approximately 500 feet from the entrance. It is ventilated by a small electrically driven fan, which produced at the last inspection a quantity of 560 cubic feet of air a minute for the use of two men and one horse. This drift is naturally wet throughout, except for the parting at the inby end; this is being treated with incombustible dust.

No. 3 EAST MINE.

A. Frew, Fireboss.

There is nothing new to report regarding operations in this mine, two repairmen and a fireboss being engaged principally in maintenance to main roads and attending to the pumps. Ventilation is produced by a 16- by 8-foot Wilson fan, which, running at a speed of 90 revolutions a minute, produced an average quantity of 83,700 cubic feet of air a minute, under a water-gauge of 1.6 inches. This mine is divided into two splits, the quantities passing in each at the last inspection measuring as follows:—No. 6 East split: 34,200 cubic feet of air a minute; Burrell gas-detector, 0.5 per cent. methane. West Side split: 25,000 cubic feet of air a minute for the use of two men and one horse; Burrell gas-detector, 1.2 per cent. methane. Main return: 75,600 cubic feet of air a minute for the use of three men and one horse; Burrell gas-detector, 1 per cent. methane.

No explosive gas has been found in the course of inspection, while the percentage of methane in the return air-currents, as determined by the Burrell gas-detector, varied from 0.3 per cent. in the No. 6 East split to 1.2 per cent. in the West Side split. A good supply of timber has been provided for the maintenance-work, while the main roadways have been kept in fairly good shape and generally free from coal-dust.

The following are the official returns from the Michel Colliery for the year ended December 31st, 1925:—

SALES AND OUTPUT FOR YEAR.	COAL.		COKE.	
(Tons of 2,240 lb.)	Tons.	Tons.	Tons.	Tons.
Sold for consumption in Canada	234,894		24,392	
" export to United States	1,233		21,936	
" " other countries				
Total sales		236,127		46,328
Used in making coke	69,717			
Used under colliery boilers, etc.	15,401			
Total for colliery use		85,118		
		321,245		
Stocks on hand first of year			410	
" last of year	290		417	
Difference added to stock during year		290		7
Output of colliery for year		321,535		46,335

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, ETC. (INCLUDING COKE-OVENS.)

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.
Supervision and clerical assistance	15		9		24	
Whites—Miners	185				185	
Miners' helpers						
Labourers	33		126		159	
Mechanics and skilled labour	113		68		181	
Boys	16		13		29	
Japanese						
Chinese—Cooks			4		4	
Indians						
Totals	362		220		582	

Corbin Coals, Ltd.

Head Office—Spokane, Wash.

Capital, $5,000,000.

A. W. Witherspoon, President, Spokane, Wash.; Austin Corbin, Vice-President, Spokane, Wash.; A. M. Allen, Treasurer, Spokane, Wash.; G. Watkin Evans, General Manager, Seattle, Wash.; E. L. Warburton, Manager, Corbin, B.C.

This colliery is situated 14 miles from McGillivray Junction on the Crowsnest branch of the Canadian Pacific Railway, to which it is connected by a branch line called the Eastern British Columbia Railway. It consists of three mines, Nos. 4, 5, and 6, the first and last named only being operated during the year.

A general description of the method of working, system of haulage in and around the mines, and surface plant has appeared in previous Annual Reports of the Minister of Mines; several important additions to the surface plant during the year being as follows: A new Sirocco fan, 36 by 54 inches, has been installed at No. 6 mine, power being supplied by a 25-horse-power electric motor, belt-connected, speed 290 revolutions a minute; this fan is capable of supplying 45,000 cubic feet of air a minute under a water-gauge of 2 inches. The railway-tracks at the washer and tipple have been extended to double capacity for storage of railway-cars. A 50-ton storage-bin has been erected at the washer to store washed steam-coal. Other additions to the plant, and almost complete for operation, are: One Ottumwa box-car loader of pusher type, with necessary housing, etc.; one 150-horse-power Waterous H.R.T. boiler at boiler plant, pressure 120 lb. per square inch, equipped with feed-water heater and feed-pump; one 180-kw. a.c. generator, 3-phase, 60 cycles, 2,300 volts, with exciter and switchboard, belt-connected to a 275-horse-power Corliss engine.

The lamp generally used by the workmen is the Edison electric cap safety-lamp, while Wolf safety-lamps are used by the officials and bratticemen for testing purposes, all lamps being cleaned and repaired in a fairly well-equipped lamp-room located in a central position at the colliery.

Copies of the "Coal-mines Regulation Act" and special rules are posted up at all the mines. Following is a brief description of the conditions prevailing in the various mines throughout the year:—

NOS. 4, 5, AND 6 MINES.

W. Almond, Overman; H. Osborne, Shiftboss; J. Virgo, G. Elmes, W. Chapman, and H. Ferryman, Firebosses.

No. 4 mine is operating the No. 4 seam, the system of working being the caving system on the retreat. It is ventilated by a single-inlet fan of the Guibal type, which, running at a speed of 90 revolutions a minute, produced an average quantity of 24,700 cubic feet of air a minute, under a water-gauge of 0.5 inch. The ventilation is all on one split, the quantity passing at the last inspection measuring as follows:—Main intake: 24,500 cubic feet of air a minute for the use of three men. Mine idle.

No explosive gas was found in the course of inspection, while the percentage of methane in the return air-current has always been under 0.5 per cent. Roadways and timbering have been kept in good shape, a good supply of timbering provided for the use of the workmen, and the requirements of the "systematic timbering" rules well attended to at the working-faces. This mine, being naturally damp, has always been free from coal-dust at all inspections.

No. 5 MINE.

There is nothing new to report in regard to this mine, as no work has been done therein during 1925.

No. 6 MINE.

A new rock tunnel has been driven on the same level as the tipple, striking the coal-seam at a distance of 400 feet from the surface. A raise connection was then driven up to the No. 1 level workings, down which all the coal is brought to the lower tunnel, thus eliminating all outside chutes.

This mine is ventilated by a 36- by 54-inch Sirocco fan, which, running at a speed of 284 revolutions a minute, produced an average quantity of 41,000 cubic feet of air a minute, under a water-gauge of 0.6 inch. Explosive gas has been found nine times in the course of inspection, mostly close to the roof at the face of raise places, while the percentage of methane in the return air-current has always been under 0.5 per cent. Roadways and timbering have been kept in good shape, a good supply of timber provided for the use of the workmen, and the requirements of the "systematic timbering" rules fairly well attended to at the working-faces. This mine being naturally damp, it has been generally free from coal-dust at all visits.

Following are the official returns from Corbin Colliery for the year ended December 31st, 1925:—

SALES AND OUTPUT FOR YEAR.	COAL.		COKE.	
(Tons of 2,240 lb.)	Tons.	Tons.	Tons.	Tons.
Sold for consumption in Canada	36,671			
" export to United States	24,994			
" " other countries				
Total sales		61,665		
Used in making coke				
Used under colliery boilers, etc.	5,465			
Total for colliery use		5,465		
		67,130		
Stocks on hand first of year	1,428			
" last of year	3,110			
Difference added to stock during year		1,682		
Output of colliery for year		68,812		

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, ETC.

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.	No. employed.	Average Daily Wage.
		$		$		$
Supervision and clerical assistance	5	6.16	10	4.40	15	5.28
Whites—Miners	52	6.04			52	6.04
Miners' helpers	15	4.80			15	4.80
Labourers			10	4.29	10	4.29
Mechanics and skilled labour	6	5.00	24	5.21	30	5.11
Boys			2	2.99	2	2.99
Japanese						
Chinese						
Indians						
Totals	78		46		124	

GOVERNMENT MINE-RESCUE STATIONS.

Mine-rescue stations are established under the authority of section 117, "Coal-mines Regulation Act," for the purpose of supplementing in case of need the colliery installations of mine-rescue apparatus, and also for the purpose of training holders of certificates of competency in the use of mine-rescue apparatus. In cases of emergency these stations are available for the use of any trained corps of mine-rescuers, duly qualified medical practitioners, or corps trained in the work of first aid to the injured, subject always to the order of an Inspector. Four stations are established, as follows:—

Nanaimo.—J. D. Stewart, Instructor; serves the coal-mines in the Nanaimo area of the Vancouver Island Inspection District.

Cumberland.—John Thomson, Instructor; serves the coal-mines in the Comox area of the Vancouver Island Inspection District.

Middlesboro.—W. C. Stone, Instructor; serves the coal-mines in the Nicola-Princeton Inspection District.

Fernie.—John T. Puckey, Instructor; serves the coal-mines in the East Kootenay Inspection District.

MINE-RESCUE STATION, NANAIMO.

REPORT BY J. D. STEWART, INSTRUCTOR.

I have the honour to submit herewith my annual report as Instructor of Government Mine-rescue Station, Nanaimo, for the year ended December 31st, 1925.

Equipment and supplies on hand are as follows: 6 sets Gibbs apparatus (complete); 6 spare cylinders; 4 spare breathing-bags; 2 spare coolers; 2 spare mouth-chambers; 3 sets of tubes; 1 manometer, gauge type; 1 manometer, mercury type; 3 spare admission-valves; 2 packing-tools; 4 spare finimeter tubes; 4 rubber tubes reducing-valves to cooler; 6 cylinder-valves; 4 spare pass-attachments; 12 sets valve packing; 24 regenerator gaskets; 24 screws for holding cover; 6 trunks Gibbs apparatus; 30 pairs smoke-goggles; 12 housing-gaskets; 12 plungers and inserts; 12 retainers; 12 cylinder-valve gaskets; 1 testing-gauge; 6 sets Paul apparatus (complete); 4 spare cylinders; 1 spare mouth-chamber; 14 flat rubber straps; 6 camps; 2 spare finimeters; 20 sets of gaskets; 6 spare valve-seats; 6 trunks; 1 standard pulmotor; 1 spare cylinder; 2 spare reducing-valves; 1 type pulmotor; 1 H.H. inhalator (complete) with 2 cylinders; 1 storage carbogen cylinder (complete); 1 connection with gauge for CO_2 tank; 6 Burrell gas-masks; 1 litter with fresh-air hood; 2 high-pressure refilling-pumps; 12 storage oxygen-tanks; 14 Edison electric safety-lamps; 1 automatic filler; 1 siphon; 1 testing coupling; 1 carbon-monoxide gas-detector; 1 Parker combination vice; 1 post drill, wrench, and hack-saw, and a full assortment of repair-tools.

Supplies received during the year 1925 were as follows: 2,200 cubic feet oxygen; 1 H.H. inhalator (complete) with 2 cylinders; 1 storage carbogen cylinder with connection and gauge; 6 Burrell gas-masks; 12 housing-gaskets; 12 plungers and inserts; 12 seat gaskets; 12 pairs goggles; 12 retainers; 12 bottle gaskets; 8 metal mouth-pieces; 1 test-gauge. Supplies used during the year 1925 were as follows: 1,200 cubic feet oxygen; 65 lb. cardoxide.

Supplies on hand, January 1st, 1926, are as follows: 2,400 cubic feet oxygen; 217 Gibbs regenerators; 214 Paul regenerators; 1,356 lb. cardoxide; 30 No. 1 Draeger regenerators.

Three cars are available for transportation of apparatus in case of emergency and use of Inspectors, as follows: 1 Studebaker six, 5-passenger; 1 Dodge, 5-passenger; 1 Ford runabout.

During the year the following men were awarded Government certificates for efficiency in mine-rescue work after a course of training at this station: Thos. J. Wood, George H. Perry, John Devlin, George F. Nash, and George E. Jardine.

Certificates were granted to the following men for a course of lectures in mine-rescue work: Joseph Dean, William Bradley, James M. Brown, William Wilson, Jonathan Pearson, and Alexander Coombs.

There were no calls received from any of the mines during the year for either mine-rescue apparatus or resuscitating devices, but two outside calls were received for the latter—one for a drowning case and the other to the Nanaimo Hospital for treatment of a patient suffering from heart-trouble.

MINE-RESCUE STATION, CUMBERLAND.

REPORT BY JOHN THOMSON, INSTRUCTOR.

I have the honour to submit my annual report for the year ended December 31st, 1925, Mine-rescue Station, Cumberland.

During the year six men had a course of instruction and six certificates were granted. During the year the Canadian Collieries (D.), Limited, has had twelve trained men in constant practice once a week. No emergent calls for mine-rescue apparatus were made during 1925.

The equipment on hand at present at this station is as follows: 6 Paul breathing apparatus (complete); 12 spare oxygen-cylinders; 1 refilling-pump; 12 150-cubic-foot oxygen-supply cylinders; 1 Draeger pulmotor; 1 type B pulmotor; 1 H.H. inhalator; 12 Edison electric safety-lamps; complete set of tools for repair-work; spare parts for the breathing apparatus; 12 refillable regenerators; 24 tins cardoxide for refillable regenerators; 65 Paul air regenerators.

During 1925 there was received from the Canadian Liquid Air Company, Limited, Vancouver, 2,250 cubic feet oxygen. On hand at the end of 1924, 1,200 cubic feet. Used during the past year, 2,400 cubic feet. Balance on hand at end of 1925, 1,050 cubic feet.

In addition to the six sets of breathing apparatus, the property of the Provincial Government, the Canadian Collieries (D.), Limited, has four complete sets of Paul breathing apparatus in this station, making a total of ten sets.

On September 7th two teams from Cumberland competed at the annual safety-first competition held in Nanaimo.

MINE-RESCUE STATION, MIDDLESBORO.

REPORT BY WILLIAM C. STONE, INSTRUCTOR.

As caretaker and instructor of the Middlesboro Mine-rescue Station, I beg to submit the following report for the year 1925:—

Equipment at this date consists of five Paul breathing-machines and stores; pulmotor; first-aid equipment.

During 1925 officials of the local mines and selected employees of the Coalmont Collieries were instructed in the rudiments of mine-rescue work. Men from Coalmont were examined as to their ability to use mine-rescue apparatus under severe conditions.

On August 22nd, 1925, I shipped to Coalmont Collieries, at the request of John G. Biggs, District Mine Inspector, the following emergency apparatus: Four complete Gibbs breathing-machines and supplies and one small oxygen inhaler. Owing to the serious fire which occurred in No. 3 mine, which had to be sealed with use of the apparatus, it was thought advisable that this equipment remain at Coalmont for the time being.

MINE-RESCUE STATION, FERNIE.

REPORT BY JOHN T. PUCKEY, INSTRUCTOR.

I have the honour to submit the following report of the work done at the Fernie Mine-rescue Station during the year 1925:—

During January two men finished their training in mine-rescue work; one of these, Ed. Morrison, is now Safety Inspector at the Coal Creek mines and has taken a great interest both in mine-rescue and first-aid work during the year.

In February the annual St. John Ambulance classes were commenced, there being an attendance at every lecture of upwards of sixty persons. These lectures are given on the Sunday afternoons by one of the local doctors; then practices are held every Tuesday and Thursday

evening from 7 to 9.30. The classes held are open to the public and in this way we get representatives from all trades in the city. A team was trained to take part in the Dominion and Provincial championship, but owing to the mines working every day at that time the team found it necessary to withdraw at the last week, as the members would have had to forfeit a day's work to attend the competition.

At the annual meeting of the East Kootenay Mine Safety Association, held at this station in March, it was decided to hold the annual mine-rescue and first-aid contests at Fernie on August 1st, providing the coal company would grant a holiday for that day. It was also decided to try and obtain some of the moving pictures advertised by the United States Bureau of Mines, sent free for the advancement of safety-first work in and around mines and other industries. After a few weeks advice was received that two pictures were being shipped, fifteen reels in all, the names being very appropriate—"When a Man's a Miner" and "When Wages Stop." These pictures were shown twice at Michel and twice at Fernie. On all occasions there were full audiences. W. R. Wilson, general manager of the Crow's Nest Pass Coal Company, said, at a meeting held in the station the following week, that it was the finest picture he had ever seen dealing with the safety-first work in and around mines; it not only showed the dangers a miner had to contend with in his daily occupation, but it also showed the extreme dangers that a rescue team had to contend with after an explosion.

In March a letter was received from Mr. Warburton, manager of the Corbin Coals, Limited, requesting that the Instructor go up there to assist in training a team in mine-rescue work, and having received instructions from Inspector Strachan, the Instructor went up to Corbin and gave them the first lecture and explained the Gibbs apparatus to them. The suggestion was made that W. Almond, overman, and a good rescue-man, take charge of them and continue their training. Four trips were made to Corbin, being accompanied on the last trip by Inspector MacDonald, who assisted in the examination of six of the candidates who had finished the full course, and the re-examination of three others who hold certificates and who had taken a short course with the Gibbs machine. Corbin Colliery now has ten certificated mine-rescue men, sufficient for two teams.

Six Burrell All Service masks and one H.H. inhalator have been installed during the year at this station and is a great addition to the equipment. Most of the rescue-men in this district have been instructed in the use of the All Service mask—namely, where the ventilation is good the mask may be used to explore for fires or heating, but when the oxygen in the air gets to 17 per cent. or under they must use the self-contained breathing apparatus.

After the East Kootenay Mine Safety Association was notified by W. R. Wilson that August 1st would be a general holiday for the purpose of holding the annual mine-rescue and first-aid contest, and that the coal company would erect the necessary mine and buildings for same and try and make it a permanent structure, several teams started in training right away, both in first-aid and mine-rescue work, and contestants were at the station every night up to the day of the contest.

Seven teams entered for the mine-rescue competition—three from Coal Creek mines, two from Michel mines, one from Corbin mine, and one from Blairmore, Alta. However, on the day of the contest the team from Corbin and the one from Blairmore, Alta., did not turn in, so the other five competed for the trophies and prizes.

Having been recommended by the Chief Inspector, the Instructor was appointed bench judge, and Inspectors MacDonald and Dickson acted as judges in the mine-work. In the assembly-work all the teams, with one or two exceptions, did fairly good work. Only four of the teams finished their mine problem, the other team having to fall out through their captain not being able to carry on. He had twisted his knee while at work in the mine about three weeks previously, but would not give up his place on the team, as he was advised, with the consequence that he collapsed and spoiled the team's chance. He was taken to the hospital on the Sunday and was kept there two weeks before the swelling went down. Coal Creek No. 1 team took first place, Fernie No. 2 took second place, and Michel No. 1 took third place. Winning this competition, J. Caufield's team won the chance to go to the Coast and compete in the Vancouver Island Mine Safety Association contest, which was to be held on Labour Day, September 7th, at which contest they again carried off the premier honours by winning the Vancouver Island shield, and in all probability this team will represent British Columbia at the international mine-rescue contest to be held in San Francisco during 1926.

The first-aid contest was won by Coal Creek team No. 2; Fernie No. 1 team took second place and Coal Creek No. 1 third place. Five teams took part in the senior first aid. There were also competitions for the ladies' and the junior first-aid events, which were watched by a large crowd with a great deal of interest.

Some of the members of the mine-rescue teams spoke about the air breathed through the machine being very warm, and in some cases blistering their tongues. This matter was taken up with H. H. Sanderson, who was present, but he could not give any explanation of it, only to say that it was very hot that day, and, the apparatus being exposed to the rays of the sun, the heat would cause the oxygen to rise in temperature and thus cause the uncomfortable feeling. After the contest a team started training, but owing to the mines working steadily the training had to be done at night-time, starting at 7 and continuing until about 9.30 p.m. Every man was watched carefully and the way he handled his machine; they were questioned as to how they felt when they had finished, and they all said, "Fine; no discomforts at all." The members of this team received their certificates of competency in December.

Before Caufield's team left for the Coast, one fine afternoon they put the apparatus on, and after climbing the hills and grades up there they all reported the apparatus working fine and had no complaints to make, so the conclusion was arrived at that it was the hot day and the excitement that caused some of them in the contest to have the uncomfortable feeling mentioned.

One thousand cubic feet of oxygen and 224 lb. of cardoxide have been used at this station, and at present 21,000 cubic feet of oxygen and 336 lb. of cardoxide are on hand, also a good supply of spare parts for the apparatus, all the latter being in good working-order. There were no calls for any of the apparatus at the station during the year.

BOARD OF EXAMINERS FOR COAL-MINE OFFICIALS.

FIRST-, SECOND-, AND THIRD-CLASS CERTIFICATES AND MINE-SURVEYING CERTIFICATES.

REPORT BY JAMES DICKSON, SECRETARY OF THE BOARD.

I have the honour to submit herewith the annual report of the transactions of the above Board for the year ended December 31st, 1925.

The Board of Examiners, which was formed on July 1st, 1919, at present consists of George Wilkinson, Chief Inspector of Mines, as Chairman; Harry Ernest Miard, member; and James Dickson, member and Secretary of the Board. The meetings of the Board are held in the office of the Board, Mines Department, Victoria.

The examinations are held in accordance with rules made by the Provincial Board of Examiners and approved by the Minister of Mines, July 16th, 1919. As these rules were published in the report of 1922 there is no need to publish them again.

Two examinations were held during 1925; the first was held on May 18th, 19th, and 20th, and the second on November 17th, 18th, and 19th.

The total number of candidates at these examinations was as follows: For First-class Certificates, 9 (4 passed and 5 failed); for Second-class Certificates, 5 (2 passed and 3 failed); for Third-class Certificates, 19 (12 passed and 7 failed); for Mine Surveyor Certificates, 4 (1 passed and 3 failed).

The following is a list of the candidates who successfully passed the examinations in the various classes:—

First-class Candidates.—Michael Dalton McLean, William King Hodge, Frank Yates, and William R. Foster.

Second-class Candidates.—Robert Houston and Joseph Owen Nicholl.

Third-class Candidates.—James Robson, William Nuttall, Asa Robinson, Henry Sharpe, Frank Coates, John Unsworth, David Stobbart, James B. Stewart, Charles E. Cloke, Thomas Hunter, Harry Hopkins, and John B. Gregson.

Mine Surveyor Candidates.—Wilfrid Patterson Lauderbach.

The work of many of the candidates, particularly in the higher grades, shows a decided lack of fundamental knowledge of the practical subjects dealt with and depend on their ability to utilize some more or less dimly understood formulæ rather than the more simple and practical means of answering the questions set. The attention of mining students in British Columbia is directed to the work of the Mining Course provided by the Department of Education. This course is of a practical nature and should prove a great advantage to students who intend to qualify as mine officials.

EXAMINATIONS FOR CERTIFICATES OF COMPETENCY AS COAL-MINERS.

In addition to the examinations and certificates already specified as coming under the Board of Examiners, the Act further provides that every coal-miner shall be the holder of a certificate of competency as such. By "miner" is meant "a person employed underground in any coal-mine to cut, shear, break, or loosen coal from the solid, whether by hand or machinery."

The work of the Board of Examiners in examining candidates for coal-miners' certificates has been carried on in all mining districts at intervals of not less than sixty days, as required by the amendment of the Act. No certificate has been granted in any case where the candidate failed to satisfy the Board as to his general fitness, experience in a coal-mine, and a working knowledge of the English language. During 1925 fifty-eight examinations were held for candidates for certificates of competency as coal-miners in the various coal-mining districts of the Province and 300 certificates issued; in addition to above, a number of duplicate certificates were issued to coal-miners who had lost their original certificate of competency.

The Board of Examiners desires to thank the different coal-mining companies for the use of their premises in holding these examinations.

The Inspector of Mines in each district has authority, under the amendment (1919) to "Coal-mines Regulation Act," to grant, after a satisfactory examination, a provisional certificate of competency as a coal-miner to applicants, which entitles the holder to follow the occupation of a coal-miner for a period not exceeding sixty days or until the date of the next regular examination before the Board.

REGISTERED LIST OF HOLDERS OF CERTIFICATES OF COMPETENCY AS COAL-MINE OFFICIALS.

FIRST-CLASS CERTIFICATES OF COMPETENCY ISSUED UNDER "COAL-MINES REGULATION ACT, 1897."

Name.	Date.	Name.	Date.
Shepherd, Francis H.	Mar. 5, 1881	Stockett, Thomas, Jr.	Aug. 3, 1901
Honobin, William	May 1, 1882	Cunliffe, John	Aug. 3, 1901
Little, Francis D.	May 1, 1882	Evans, Daniel	Aug. 3, 1901
Chandler, William	Dec. 21, 1883	Browitt, Benjamin	Aug. 3, 1901
Priest, Elijah	Dec. 21, 1883	McEvoy, James	Oct. 17, 1902
Randle, Joseph	Jan. 18, 1888	Wilson, A. R.	Oct. 17, 1902
Matthews, John	Jan. 8, 1889	Simister, Charles	Oct. 17, 1902
Norton, Richard Henry	Aug. 26, 1889	Budge, Thomas	Oct. 17, 1902
Kesley, John	Mar. 4, 1892	Richards, James A.	Oct. 17, 1902
Wall, William H.	May 30, 1896	McLean, Donald	Jan. 21, 1904
Wilson, David	May 30, 1896	Wilkinson, Geo.	Jan. 21, 1904
Smith, Frank B.	May 30, 1896	Wright, H. B.	Jan. 21, 1904
Bradshaw, George B.	June 12, 1899	Coulthard, R. W.	Jan. 21, 1904
Simpson, William G.	June 12, 1899	Roaf, J. Richardson	Jan. 21, 1904
Hargreaves, James	Feb. 5, 1901	John, John	Jan. 21, 1904
Drinnan, Robert G.	Feb. 5, 1901	Manley, H. L.	Jan. 21, 1904

FIRST-CLASS CERTIFICATES ISSUED UNDER "COAL-MINES REGULATION ACT FURTHER AMENDMENT ACT," 1904–1911–1919.

Name.	Date.	Name.	Date.
Baxter, Andrew	June 10, 1911	McDonald, John	Oct. 3, 1919
Battey, Richard	May 27, 1913	McGuckie, Thomas	July 22, 1908
Biggs, J. G.	July 22, 1908	McKendrick, Andrew	May 27, 1913
Bonar, Robert	Oct. 28, 1911	McLean, Michael D.	June 16, 1925
Brace, Tom	May 13, 1915	McMillan, J. H.	Sept. 10, 1910
Bridge, Edward	July 22, 1908	McVicar, Samuel	May 1, 1909
Brown, David	May 21, 1914	Mazey, William John	Oct. 31, 1912
Brown, Robert Joyce	May 13, 1915	Miard, Henry Ernest	May 9, 1912
Caufield, Bernard	May 1, 1909	Millar, John K.	Nov. 22, 1906
Church, James A. H.	June 10, 1911	Miller, Andrew Anderson	Oct. 31, 1912
Cox, Richard	May 13, 1915	Montgomery, John W.	May 1, 1909
Crowder, James	June 10, 1911	Moore, Wm. H.	May 17, 1917
Cunningham, John Howard	May 9, 1912	Mordy, Thomas	Sept. 10, 1910
Davidson, W. A.	May 1, 1909	Morrison, Edward	June 24, 1924
Davies, David	June 10, 1911	Mottishaw, Sam. K.	Nov. 15, 1917
Davies, Stephen	Nov. 15, 1917	Murray, George	June 21, 1921
Davies, Thos. Owen	May 21, 1914	Newbury, Arthur	June 21, 1920
de Hart, J. B.	May 17, 1917	O'Brien, George	May 21, 1914
Derbyshire, James	Nov. 9, 1907	Ovington, John	May 27, 1913
Devlin, Henry	May 1, 1909	Peacock, Frank David	Oct. 28, 1911
Dickson, James	Oct. 31, 1912	Penman, Hugh	May 21, 1914
Elliott, Daniel	Nov. 9, 1907	Phelan, Arthur	May 27, 1913
Emmerson, Joseph	Nov. 9, 1907	Powell, J. W.	June 10, 1911
Ewart, William	May 19, 1922	Quinn, John Graham	July 8, 1916
Fairfoull, Robert	June 10, 1911	Ramsay, Peter Millar	May 16, 1918
Foster, William R.	Dec. 31, 1925	Roper, William	May 13, 1915
France, Thos.	Nov. 22, 1906	Russell, John	May 21, 1914
Fraser, Norman	Mar. 4, 1905	Scott, Thomas Wright	Dec. 22, 1921
Freeman, H. N.	May 1, 1909	Shanks, John	May 1, 1909
Galloway, C. F. J.	July 22, 1908	Shenton, T. J.	Sept. 10, 1910
Garman, Morris W.	Nov. 15, 1917	Shone, Samuel	May 1, 1909
Gascoyne, Rowland B.	May 21, 1914	Smith, A. E.	Oct. 28, 1911
Gillham, John	Jan. 5, 1925	Smith, Joseph	July 22, 1908
Glover, Francis	Oct. 31, 1912	Smith, Thos. Edwin	Dec. 19, 1918
Graham, Charles	Nov. 14, 1905	Spicer, J. E.	Oct. 28, 1911
Graham, Thomas	Nov. 9, 1907	Spruston, T. A.	Nov. 27, 1909
Gray, James	Nov. 27, 1909	Stevens, L. C.	Nov. 27, 1909
Henderson, Robert	Nov. 27, 1909	Stewart, R. T.	Sept. 10, 1910
Hewlett, Howe	May 27, 1913	Strachán, Robert	Mar. 4, 1905
Higgins, Alexander	Dec. 19, 1918	Strang, James	June 10, 1911
Hodge, William K.	June 16, 1925	Taylor, James	May 16, 1918
Holden, James	May 1, 1909	Thomas, J. D.	Sept. 10, 1910
Howden, Archibald	May 27, 1913	Thorne, B. L.	Sept. 10, 1910
Howells, Nathaniel	Oct. 28, 1911	Touhey, James	May 21, 1914
Hughes, John C.	May 17, 1917	Vincent, Thomas C.	June 24, 1924
Humphries, Clifford	June 10, 1911	Walker, William	May 16, 1918
Hunter, Alex. B.	July 8, 1916	Wallbank, J.	Sept. 10, 1910
Huntrods, Eustace S. F.	May 19, 1922	Warburton, Ernest Leonard	July 8, 1916
Jackson, Thos. R.	Nov. 9, 1907	Wark, Samuel David	Oct. 3, 1919
James, William	July 22, 1908	Wesnedge, William	Dec. 19, 1918
Jaynes, Frank	May 13, 1915	Whittaker, John	Dec. 19, 1918
Jemson, Jas. W.	May 27, 1913	Williams, Jahn Samuel	Dec. 19, 1918
Kellock, George	June 10, 1911	Williams, Thos. B.	May 17, 1917
Knox, T. K.	July 27, 1909	Williams, Thos. H.	Nov. 22, 1906
Laird, Robert	Nov. 15, 1917	Wilson, Ridgeway R.	Nov. 15, 1917
Leighton, Henry	May 9, 1912	Wilson, William	May 16, 1918
Mackinnon, Hugh G.	May 19, 1922	Wylie, John	July 22, 1908
Macauley, D. A.	June 10, 1911	Yates, Frank	Dec. 31, 1925
McCulloch, James	Sept. 10, 1910		

SECOND-CLASS CERTIFICATES OF SERVICE.

Name.	Date.	No.	Name.	Date.	No.
Lee, John S.	Mar. 4, 1905	B 9	Walker, David	Mar. 4, 1905	B 14
Millar, J. K.	Mar. 4, 1905	B 10	Powell, William Baden	Mar. 4, 1905	B 16
McCliment, John	Mar. 4, 1905	B 11	Bryden, Alexander	Mar. 4, 1905	B 18
Hunt, John	Mar. 4, 1905	B 13			

SECOND-CLASS CERTIFICATES OF COMPETENCY ISSUED UNDER "COAL-MINES REGULATION ACT FURTHER AMENDMENT ACT, 1904."

Name.	Date.	No.	Name.	Date.	No.
Adamson, Robert	Sept. 10, 1910	B 120	Dickenson, Clifford	May 13, 1915	B 189
Allan, Alex. McDiarmid	May 27, 1913	B 167	Dunsmuir, John	Nov. 14, 1905	B 26
Almond, Walter	Nov. 15, 1917	B 213	Duncan, James	Nov. 21, 1923	B 255
Alstead, Robert	June 24, 1924	B 257	Dykes, J. W.	May 1, 1909	B 77
Archibald, William	Nov. 22, 1922	B 250	Eccleston, Wm.	May 1, 1909	B 87
Ball, Benjamin	June 21, 1920	B 235	Fairfoull, James	May 21, 1914	B 186
Barclay, Andrew	July 29, 1905	B 25	Fairfoull, R.	May 1, 1909	B 83
Barlow, Benjamin Robt.	Dec. 19, 1918	B 229	Finlayson, James	July 29, 1905	B 21
Bastian, Albert	Nov. 21, 1923	B 256	Ford, Allan	May 27, 1913	B 171
Baybutt, Thomas	July 8, 1916	B 206	Foster, W. R.	Nov. 27, 1909	B 102
Bell, John	May 17, 1917	B 212	France, Thos.	May 14, 1905	B 27
Beveridge, William	June 21, 1920	B 233	Francis, David M.	May 21, 1914	B 182
Bevis, Nathaniel	Sept. 10, 1910	B 123	Francis, Enoch	May 1, 1909	B 86
Biggs, John	May 1, 1909	B 94	Francis, James	July 22, 1908	B 63
Biggs, John G.	Nov. 2, 1907	B 40	Frater, George	July 8, 1916	B 204
Blair, James	May 13, 1915	B 197	Freeman, Henry N.	Nov. 2, 1907	B 45
Brace, Tom	Nov. 27, 1909	B 96	Garbett, Richard	Oct. 31, 1912	B 161
Bridge, Edward	Oct. 23, 1906	B 33	Garman, Morris Wilbur	Oct. 31, 1912	B 155
Brown, David	Sept. 10, 1910	B 108	Gilham, John	June 21, 1920	B 237
Brown, George	Dec. 19, 1918	B 225	Gillespie, Hugh	July 29, 1905	B 24
Brown, James L.	Oct. 28, 1911	B 136	Gillespie, John	Oct. 23, 1906	B 36
Brown, John C.	Oct. 23, 1906	B 39	Gould, Alfred	May 13, 1915	B 190
Brown, John Todd	May 9, 1912	B 150	Gourlay, Robert	Dec. 19, 1918	B 227
Brown, R. J.	Oct. 28, 1911	B 134	Graham, Chas.	Mar. 4, 1905	B 1
Brown, Robert	May 21, 1914	B 183	Gray, David	May 1, 1909	B 76
Brown, Robert Sneddon	May 13, 1915	B 196	Gray, George	July 8, 1916	B 207
Brown, William Gold	Dec. 19, 1918	B 228	Greenwell, Archibald	May 16, 1918	B 220
Brownrigg, John H.	May 17, 1917	B 124	Hamilton, Robert N.	May 21, 1914	B 175
Bushell, J. P.	May 1, 1909	B 81	Hastings, Andrew P.	Dec. 19, 1918	B 223
Carroll, Henry	July 22, 1908	B 62	Henderson, Robert	July 22, 1908	B 60
Caufield, Bernard	Oct. 23, 1906	B 30	Hodge, William K.	Jan. 5, 1925	B 259
Caufield, John	July 8, 1916	B 199	Holliday, William	Dec. 19, 1918	B 230
Cawthorne, L.	May 1, 1909	B 93	Horrocks, Abner G.	June 10, 1911	B 130
Challinor, Jno. Thomas	May 27, 1913	B 169	Houston, Robert	June 16, 1925	B 260
Challoner, Jno. Arthur	May 21, 1914	B 178	Howells, Nathaniel	Nov. 27, 1909	B 97
Churchill, James	July 22, 1908	B 65	Hudson, George	Sept. 10, 1910	B 121
Clark, Robt.	June 21, 1921	B 242	Hughes, John C.	Sept. 10, 1910	B 109
Clarkstone, Wm. W.	May 21, 1914	B 180	Hutton, Isaac	May 21, 1914	B 185
Commons, Wm.	Sept. 10, 1910	B 115	Hutton, John	May 9, 1912	B 154
Coupland, George	May 16, 1918	B 217	Hynds, William	Dec. 14, 1920	B 240
Courtney, A. W.	Oct. 28, 1911	B 138	Hynds, John	May 18, 1922	B 247
Cox, Richard	May 9, 1912	B 143	Jackson, Thos. R.	Mar. 4, 1905	B 5
Crawford, David	May 1, 1909	B 88	James, David	Nov. 2, 1907	B 58
Cunliffe, Thomas	May 1, 1909	B 78	Jarrett, Fred	May 1, 1909	B 84
Dando, John	May 27, 1913	B 164	Jaynes, Frank	Sept. 10, 1910	B 111
Daniels, David	Nov. 2, 1907	B 53	John, Francis	July 8, 1916	B 200
Derbyshire, James	Oct. 23, 1906	B 32	John, Howell	Sept. 10, 1910	B 122
Davidson, Hugh	May 27, 1913	B 165	Johnson, Moses	May 1, 1909	B 75
Davies, Stephen	Sept. 10, 1910	B 113	Jones, Samuel	May 16, 1918	B 221
Dennis, Fred. W.	May 21, 1914	B 174	Jones, William T.	July 22, 1908	B 66
Devlin, Ernest H.	May 21, 1914	B 179	Jordon, Thos.	Nov. 27, 1909	B 104
Devlin, Henry	Nov. 2, 1907	B 44	Joyce, Walter	May 27, 1913	B 168
Dewar, Alexander	Oct. 31, 1912	B 162	Kirkwood, John R.	Oct. 31, 1912	B 160

Second-class Certificates of Competency issued under "Coal-mines Regulation Act Further Amendment Act, 1904"—*Continued.*

Name.	Date.	No.	Name.	Date.	No.
Knowles, James E.	Oct. 28, 1911	B 137	Ramsay, Peter Millar	May 17, 1917	B 209
Laird, Robert	May 17, 1917	B 210	Rankin, Geo.	Nov. 27, 1909	B 103
Lander, Frank	May 13, 1915	B 195	Raynes, M. T.	Oct. 28, 1911	B 139
Lane, Joseph	May 9, 1912	B 142	Reid, Wm.	Oct. 28, 1911	B 132
Lee, Robert John	Sept. 10, 1910	B 110	Renny, James	Oct. 28, 1911	B 140
Littler, Matthew	Oct. 31, 1912	B 157	Richards, Thomas	Nov. 2, 1907	B 57
Luck, George	June 10, 1911	B 128	Richards, Samuel	May 9, 1912	B 152
Manifold, Albert	May 9, 1912	B 145	Rigby, John	July 29, 1905	B 29
Marsh, John	Nov. 15, 1917	B 216	Roberts, Ebenezer	Sept. 10, 1910	B 117
Mason, Joseph	May 13, 1915	B 193	Robinson, William	July 22, 1908	B 69
Massey, H.	Nov. 27, 1909	B 99	Rogers, George	May 1, 1909	B 79
Mather, Thomas	June 10, 1911	B 127	Roper, William	May 9, 1912	B 141
Matusky, A.	May 1, 1909	B 91	Rowbottom, Thomas	May 16, 1918	B 222
Mayer, Ralph Waldo	May 9, 1912	B 144	Russell, John	Nov. 2, 1907	B 47
Mazay, W. J.	Nov. 27, 1909	B 101	Rutherford, Jasper	May 16, 1918	B 219
Menzies, Fred	Dec. 22, 1921	B 244	Scarpino, Francis	Dec. 19, 1918	B 226
Merryfield, William	July 22, 1908	B 61	Scott, Thomas Wright	June 21, 1921	B 241
Miard, Hy. E.	Sept. 10, 1910	B 107	Shanks, David	Oct. 31, 1912	B 159
Michek, John	May 17, 1917	B 188	Shaw, Thomas John	May 27, 1913	B 166
Middleton, Robert	July 22, 1908	B 72	Smith, John	Oct. 3, 1919	B 231
Mitchell, Henry	July 8, 1916	B 201	Smart, Robert K.	Nov. 22, 1922	B 248
Monks, James	Nov. 2, 1907	B 55	Somerville, Alex.	Mar. 4, 1905	B 4
Moore, Wm. H.	May 21, 1914	B 173	Spruston, Robert Lecce	July 8, 1916	B 202
Morgan, John	Nov. 2, 1907	B 43	Spruston, Thos. A.	Nov. 2, 1907	B 46
Morgan, William	Dec. 19, 1918	B 224	Stafford, Matthew	June 10, 1911	B 131
Morgan, Daniel	Nov. 21, 1923	B 254	Stewart, J. M.	May 1, 1909	B 95
Morris, John	July 22, 1908	B 67	Stobbart, Jacob	May 9, 1912	B 153
Morrison, Edward	Nov. 21, 1923	B 253	Stockwell, William	Nov. 2, 1907	B 56
Morton, Robert W.	July 22, 1908	B 59	Strang, Thomas	Oct. 31, 1912	B 158
Mottishaw, S. K.	Oct. 28, 1911	B 135	Stubbs, Clement	May 18, 1922	B 245
Murray, George	Oct. 3, 1919	B 232	Sutherland, John	May 16, 1918	B 218
Musgrave, J.	May 1, 1909	B 90	Taylor, James	May 13, 1915	B 194
Myers, Peter	May 9, 1912	B 149	Taylor, Thomas	July 8, 1916	B 203
MacKinnon, Hugh G.	Dec. 22, 1921	B 243	Thomas, J. B.	Nov. 27, 1909	B 105
McLaughlin, Alex	May 13, 1915	B 191	Thomas, Joseph D.	Oct. 23, 1906	B 38
McDonald, J. A.	Oct. 28, 1911	B 133	Thomas, Daniel W.	Nov. 22, 1922	B 249
McDonald, John	May 27, 1913	B 172	Thompson, Joseph	Sept. 10, 1910	B 114
McFegan, W.	Nov. 31, 1909	B 106	Touhey, James	May 9, 1912	B 147
McFegan, Robert	May 18, 1922	B 246	Touhey, William	July 8, 1916	B 205
McGarry, Martin	Oct. 31, 1912	B 156	Tonge, Thomas	July 22, 1908	B 71
McGuckie, Thomas M.	Oct. 23, 1906	B 35	Tully, Thomas	Nov. 15, 1917	B 214
McKelvie, J.	May 1, 1909	B 92	Vanhulle, Peter	Nov. 2, 1907	B 54
McKendrick, And.	Sept. 10, 1910	B 112	Virgo, John	May 1, 1909	B 89
McLean, Michael D.	June 21, 1920	B 234	Walker, William	May 13, 1915	B 192
McMillan, D.	June 10, 1911	B 125	Warburton, Ernest L.	May 27, 1913	B 170
McNay, Carmichael	May 9, 1912	B 151	Watson, Adam G.	Nov. 14, 1905	B 28
McPherson, James E.	July 22, 1908	B 73	Watson, Arthur W.	May 17, 1917	B 211
Neen, Joseph	June 10, 1911	B 129	Webber, John Frank	Mar. 4, 1905	B 3
Newbury, Arthur	May 21, 1914	B 184	Webster, James S.	June 24, 1924	B 258
Newton, Wm.	Sept. 10, 1910	B 116	Wesnedge, William	Nov. 27, 1909	B 98
Nicholl, Joseph O.	Dec. 31, 1925	B 261	White, John	Nov. 2, 1907	B 48
O'Brien, Charles	May 9, 1912	B 148	Whitehouse, William	Oct. 31, 1912	B 163
O'Brien, George	May 1, 1909	B 82	Williams, John Samuel	Nov. 15, 1917	B 215
Osborne, Hugh	Dec. 14, 1920	B 239	Williams, Watkin	Sept. 10, 1910	B 118
Ovington, John	Nov. 2, 1907	B 52	Wilson, Robinson	May 21, 1914	B 177
Park, William	June 21, 1920	B 238	Wilson, Thomas	July 22, 1908	B 74
Parkinson, T.	May 1, 1909	B 80	Wilson, William	July 22, 1908	B 70
Parnham, Charles	Nov. 2, 1907	B 49	Wood, Thos. James	May 21, 1914	B 176
Quinn, James	May 21, 1914	B 181	Worthington, Joseph	May 1, 1909	B 85
Quinn, John	May 9, 1912	B 146	Yates, Frank	Nov. 22, 1922	B 251

THIRD-CLASS CERTIFICATES ISSUED UNDER "COAL-MINES REGULATION ACT FURTHER AMENDMENT ACT, 1904."

Name.	Date.	No.	Name.	Date.	No.
Adamson, Robert	May 1, 1909	C 323	Cairns, Andrew	June 10, 1911	C 420
Adamson, Wm.	Dec. 22, 1921	C 721	Cairns, Robert	May 27, 1913	C 539
Ainsworth, Edward	May 16, 1918	C 674	Caldwell, Daniel	May 17, 1917	C 639
Allan, Alexander	Oct. 28, 1911	C 430	Caldwell, Peter	June 21, 1921	C 715
Almond, Alex	Oct. 1, 1907	C 252	Calverly, Joseph	Sept. 10, 1910	C 375
Almond, Walter	July 22, 1908	C 286	Camamile, Hollis	Oct. 28, 1911	C 443
Alstead, Robt.	June 21, 1921	C 719	Campbell, Samuel	Nov. 15, 1917	C 662
Anderson, John	Oct. 28, 1911	C 437	Campbell, Andrew	Nov. 27, 1917	C 651
Anderson, Peter Blane	Nov. 15, 1917	C 660	Carroll, George	Nov. 21, 1922	C 746
Anderson, Robt.	Oct. 14, 1914	C 599	Carr, Peter	Oct. 31, 1912	C 497
Angell, William	May 21, 1914	C 591	Carson, George	Mar. 17, 1917	C 663
Arbuckle, John	May 13, 1915	C 622	Cartwright, Wm. H.	June 24, 1924	C 768
Archibald, Geo.	May 21, 1914	C 569	Catchpole, Charles	July 29, 1905	C 227
Archibald, Thomas	Oct. 28, 1911	C 454	Caufield, Edward	May 16, 1918	C 670
Ball, Alfred	May 17, 1917	C 635	Caufield, John	May 1, 1909	C 321
Bann, Thomas	Oct. 31, 1912	C 494	Challoner, Arthur	Oct. 28, 1911	C 433
Baggaley, J.	July 22, 1908	C 300	Chambers, Ralph H.	Dec. 14, 1920	C 709
Bain, James	May 27, 1913	C 546	Chapman, Wm.	Dec. 22, 1921	C 720
Bainbridge, James	Nov. 21, 1922	C 744	Chapman, John	May 30, 1923	C 753
Ball, Benjamin	May 21, 1914	C 583	Chapman, Thomas H.	Jan. 5, 1925	C 779
Barker, Robert	June 10, 1911	C 415	Charnock, John	Nov. 15, 1917	C 653
Barlow, B. R.	May 1, 1909	C 337	Cheetham, Ben	July 22, 1908	C 311
Bastian, Albert	May 30, 1923	C 750	Chester, John	Oct. 28, 1911	C 440
Bateman, Joseph William	Oct. 28, 1913	C 551	Clark, Lewis	June 10, 1911	C 405
Bauld, Wm.	June 10, 1911	C 422	Clark, Walter Pattison	May 9, 1912	C 480
Baxter, Robert	Oct. 28, 1911	C 450	Clarkson, Robert	June 21, 1920	C 696
Baybutt, Thomas	May 27, 1913	C 548	Clarkstone, Wm. W.	Oct. 28, 1911	C 431
Beard, Henry C.	May 30, 1923	C 751	Clarkstone, Hugh	May 17, 1922	C 736
Beeton, D. H.	May 1, 1909	C 338	Cleaves, Walter	May 9, 1912	C 475
Bell, Fred	May 27, 1913	C 514	Clifford, William	July 22, 1908	C 313
Bell, John	May 9, 1912	C 477	Cloke, Chas. E.	June 16, 1925	C 782
Bennett, Andrew M.	Nov. 15, 1917	C 661	Coates, Frank	June 16, 1925	C 789
Bennett, John	Oct. 14, 1914	C 597	Colgrove, Charles Henry	Dec. 19, 1918	C 679
Bennie, John	June 10, 1911	C 411	Commons, William	July 22, 1908	C 304
Beveridge, Wm.	June 10, 1911	C 396	Coupland, David	June 21, 1921	C 713
Biggs, John	Mar. 4, 1905	C 210	Cooke, Joseph	Mar. 4, 1905	C 209
Biggs, Thomas	Oct. 28, 1911	C 449	Coomb, Alexander	May 27, 1913	C 533
Birchell, Richard	Oct. 1, 1907	C 266	Cooper, John Andrew	Dec. 19, 1918	C 689
Blair, James	Oct. 31, 1912	C 502	Cope, Frank	Oct. 28, 1913	C 549
Blas, Emil	June 24, 1924	C 774	Coulthard, James	June 10, 1911	C 407
Blewett, Ernest	July 22, 1908	C 298	Crawford, David	Mar. 4, 1905	C 208
Blinkhorn, Thomas	Dec. 19, 1918	C 681	Cunningham, G. F.	Nov. 11, 1905	C 229
Bradley, William	July 22, 1908	C 291	Cunliffe, Thos.	Oct. 1, 1907	C 265
Bradley, Wilfred	May 17, 1922	C 733	Dabb, Owen	May 21, 1914	C 578
Bridge, Edward	July 29, 1905	C 223	Dando, John	May 9, 1912	C 465
Briscoe, F.	July 22, 1908	C 309	Davey, George	June 21, 1921	C 718
Broderick, Matthew	Jan. 21, 1913	C 525	Davidson, Hugh	May 9, 1919	C 464
Brown, Arthur A.	Oct. 14, 1914	C 596	Davies, Alfred	Oct. 3, 1912	C 691
Brown, David	Nov. 1, 1909	C 348	Davies, Evan Thomas	May 9, 1912	C 463
Brown, George	July 8, 1916	C 626	Davies, John H. C.	May 17, 1922	C 729
Brown, George A.	Dec. 14, 1920	C 706	Davis, John David	May 16, 1918	C 669
Brown, James	Sept. 10, 1910	C 364	Davis, William	May 1, 1909	C 339
Brown, James	June 10, 1911	C 412	Dean, Andrew	Dec. 19, 1918	C 688
Brown, James	July 8, 1916	C 625	Dean, Joseph	May 13, 1915	C 611
Brown, Jas. Millie	May 13, 1915	C 615	Derbyshire, A.	June 10, 1911	C 401
Brown, John	Sept. 10, 1910	C 392	Dewar, Alex.	Sept. 10, 1910	C 369
Brown, Robert	Oct. 28, 1911	C 451	Devlin, Edward	Oct. 23, 1906	C 241
Brown, Robert D.	June 10, 1911	C 423	Devlin, Ernest Henry	May 27, 1913	C 538
Brown, Robert S.	June 10, 1911	C 408	Devlin, John	Oct. 3, 1919	C 693
Brown, Wm. A.	May 21, 1914	C 576	Devoy, William	May 17, 1917	C 638
Brown, William Gold	July 8, 1916	C 629	Dickenson, Clifford	May 27, 1917	C 532
Bruce, Preston	Dec. 14, 1920	C 712	Dickie, Leslie	Nov. 20, 1923	C 762
Bullen, Thomas	Sept. 10, 1910	C 379	Dingsdale, Geo.	Oct. 28, 1911	C 459
Bushell, Jas. P.	Oct. 1, 1907	C 264	Dobie, Thomas	Dec. 22, 1921	C 726
Bysouth, Thomas	May 16, 1918	C 673	Doherty, J. J.	May 1, 1909	C 340

THIRD-CLASS CERTIFICATES ISSUED UNDER "COAL-MINES REGULATION ACT FURTHER AMENDMENT ACT, 1904"—*Continued.*

Name.	Date.	No.	Name.	Date.	No.
Doney, John	Mar. 4, 1905	C 211	Heaps, Robert	Sept. 10, 1910	C 373
Donnachie, John	June 10, 1911	C 425	Hemer, Herbert	Oct. 14, 1914	C 595
Doodson, Robert	Oct. 28, 1911	C 455	Henney, Jonathan	June 10, 1911	C 424
Dorrance, Orlin William	Jan. 21, 1913	C 517	Hendry, James	May 9, 1912	C 471
Douglas, D. B.	Oct. 23, 1906	C 235	Herd, William	Dec. 19, 1918	C 682
Dow, And. Y.	May 21, 1914	C 587	Heyes, Edward	May 1, 1909	C 320
Drybrough, Robert	June 21, 1920	C 701	Hilley, Fred	July 22, 1908	C 290
Dunn, Wm.	Oct. 14, 1914	C 606	Hilton, Mathias	Dec. 19, 1918	C 677
Dunnigan, Richard	June 21, 1921	C 716	Hilton, R. G.	Sept. 10, 1910	C 376
Dykes, Isaac	June 10, 1911	C 409	Hindmarsh, Peter	May 30, 1923	C 755
Dykes, Joseph W.	Oct. 1, 1907	C 248	Hodson, R. H.	Mar. 4, 1905	C 216
Eccleston, Thomas	May 17, 1917	C 482	Hodge, William K.	Nov. 20, 1923	C 761
Eccleston, John I.	May 30, 1923	C 757	Holdsworth, William	May 16, 1918	C 671
Edwards, John	May 27, 1913	C 542	Holliday, William	July 8, 1916	C 634
Elliott, John	May 27, 1913	C 541	Hopkins, Harry	Dec. 31, 1925	C 791
Elmes, George	Oct. 31, 1912	C 511	Horbury, Joseph W.	June 10, 1911	C 406
Evans, D.	July 22, 1908	C 284	Horrocks, A. G.	May 1, 1909	C 324
Ewing, Robert	May 13, 1915	C 608	Horwood, S.	July 22, 1908	C 312
Fairfoull, James	Oct. 28, 1911	C 453	Houston, Robert	July 8, 1916	C 631
Farrow, John William	Dec. 19, 1918	C 683	Howells, Nathaniel	May 1, 1909	C 316
Ferryman, Henry	June 21, 1920	C 697	Hunter, Thomas	June 16, 1925	C 786
Fitzpatrick, T. J.	Oct. 2, 1911	C 452	Hutchison, Ben	Nov. 14, 1905	C 232
Flockart, David	Jan. 21, 1913	C 531	Hutchison, Fred	Nov. 27, 1909	C 358
Ford, Allen	Oct. 28, 1911	C 445	Hynd, John	Dec. 14, 1920	C 707
Fowler, Robert	Oct. 31, 1912	C 495	Hynds, William	July 8, 1916	C 632
Francis, David Morgan	Oct. 28, 1913	C 558	Ireson, John	Oct. 31, 1912	C 507
Francis, James	Oct. 1, 1907	C 250	Irvine, David	June 10, 1911	C 413
Frater, George	May 13, 1915	C 616	Jack, John	May 21, 1914	C 582
Freeman, H. N.	Nov. 14, 1905	C 230	Jackson, Harry	June 24, 1924	C 776
Frew, William M.	May 30, 1923	C 752	James, Thos.	May 21, 1914	C 588
Frew, Andrew	Nov. 27, 1909	C 360	Jardine, Geo. Edward	Jan. 21, 1913	C 521
Frodsham, Vincent	July 22, 1908	C 282	Jarrett, Fred. J.	Oct. 1, 1907	C 256
Furbow, John	Jan. 21, 1913	C 528	Jaynes, Frank	July 22, 1908	C 277
Gabriel, Ernest P.	May 17, 1922	C 739	Jemson, J. W.	Mar. 4, 1905	C 205
Garbett, Richard	Sept. 10, 1910	C 377	Jenkins, John	Sept. 10, 1910	C 390
Gascoyne, Rowland B.	Jan. 21, 1913	C 513	John, Howel	July 22, 1908	C 305
Geater, Jas. Gordon	May 21, 1914	C 573	Johnson, Moses	Oct. 1, 1907	C 258
Gemmell, James	Oct. 31, 1912	C 505	Johnston, Robert	May 9, 1912	C 479
Gillham, John	May 13, 1915	C 623	Jones, Alf. Geo.	May 21, 1914	C 584
Gillies, William	May 16, 1918	C 668	Jones, Samuel	May 27, 1913	C 518
Glenn, James	Oct. 28, 1911	C 435	Jones, William C.	Jan. 21, 1913	C 556
Gordon, Davis John	May 9, 1912	C 474	Jones, William Ernest	Oct. 28, 1913	C 221
Gourley, Robert	May 9, 1912	C 470	Jones, W. T.	Mar. 4, 1905	C 544
Gray, George	May 9, 1912	C 467	Joyce, Walter	Nov. 27, 1909	C 361
Gregory, William	May 30, 1923	C 756	Judge, Peter	Sept. 10, 1910	C 391
Gregson, John B.	Dec. 31, 1925	C 790	Keenan, Wm. James	June 10, 1911	C 426
Green, William	Nov. 15, 1917	C 659	Kelly, Ernest	May 17, 1917	C 646
Greenhorn, John	May 21, 1914	C 575	Kemp, Wm.	Oct. 14, 1914	C 594
Groat, Ed. Murray	Nov. 20, 1923	C 764	Kingham, Alfred	Oct. 28, 1913	C 559
Griffiths, Edward	Oct. 31, 1914	C 508	Kirkeberg, H. S.	Nov. 27, 1909	C 350
Gunniss, Matthew	May 9, 1912	C 460	Klejko, Steve	Dec. 14, 1920	C 703
Haile, Joseph G.	May 17, 1922	C 731	Lane, Joseph	Oct. 1, 1907	C 254
Hallinan, William	May 1, 1909	C 343	Lavin, Joseph	June 21, 1920	C 700
Hall, Joseph	May 17, 1922	C 742	Leeman, T.	May 1, 1909	C 345
Halsall, J.	July 22, 1908	C 307	Lester, Frank	May 17, 1922	C 734
Hamilton, John	Oct. 28, 1911	C 444	Lewis, Benj. J.	Sept. 10, 1910	C 386
Hamilton, Robert Nesbitt	Oct. 28, 1913	C 550	Leynard, Paul	May 17, 1917	C 637
Hampton, Samuel	Nov. 15, 1917	C 650	Liddle, John	July 29, 1905	C 228
Hancock, Arthur	Nov. 15, 1917	C 656	Lindsay, William	May 17, 1917	C 642
Hardy, Edward	June 21, 1920	C 694	Linn, George Y.	May 17, 1922	C 737
Hartley, Thomas	Oct. 31, 1912	C 510	Littler, John	June 10, 1911	C 410
Hart, Daniel M.	May 17, 1922	C 730	Littler, Matthew	June 10, 1911	C 417
Harwood, Fred	Sept. 10, 1910	C 384	Littler, Robert	June 10, 1911	C 418
Harvey, Thomas	May 9, 1912	C 466	Livingstone, Alex	Oct. 28, 1911	C 436
Harvie, George	Sept. 10, 1910	C 378	Loxton, George	June 10, 1911	C 428

THIRD-CLASS CERTIFICATES ISSUED UNDER "COAL-MINES REGULATION ACT FURTHER AMENDMENT ACT, 1904"—*Continued.*

Name.	Date.	No.
Loxton, John	June 10, 1911	C 416
Lloyd, Thomas	May 17, 1922	C 740
Luck, George	May 1, 1909	C 318
Lynch, Stewart	Oct. 28, 1911	C 432
Mackie, John	June 10, 1911	C 421
Makin, J. Wm.	Sept. 10, 1910	C 385
Malone, John	May 21, 1914	C 585
Malone, Patrick	Oct. 1, 1907	C 247
Maltman, James	Oct. 31, 1912	C 501
Mansfield, A.	May 1, 1909	C 336
Marrs, John	May 17, 1917	C 640
Marsh, Daniel Parks	May 27, 1913	C 513
Marsh, John	Oct. 1, 1907	C 270
Martin, James	June 10, 1911	C 398
Mason, Joseph	July 22, 1908	C 297
Massey, Henry	May 1, 1909	C 317
Mather, Thomas	July 22, 1908	C 293
Matusky, Andrew	Oct. 1, 1907	C 259
Mawson, J. T.	Nov. 27, 1909	C 359
Maxwell, Geo.	May 21, 1914	C 571
McAlpine, John	Mar. 4, 1905	C 217
McArthur, John Malcolm	May 17, 1917	C 648
McArthur, Robert	Dec. 22, 1921	C 723
McBroom, Al.	July 2, 1908	C 287
McCourt, John	Oct. 14, 1914	C 605
McCulloch, James	May 1, 1909	C 315
McDonald, John	Oct. 28, 1911	C 448
McFagen, Alexander	May 9, 1912	C 490
McFegan, Robert	June 21, 1920	C 698
McFegan, W.	May 1, 1909	C 319
McGarry, Martin	May 1, 1909	C 326
McGrath, James	July 8, 1916	C 630
McGuckie, Jno. M.	May 21, 1914	C 562
McGuckie, Thomas	July 29, 1905	C 226
McGuire, Thomas	Oct. 28, 1913	C 553
McIntyre, Neil	May 21, 1914	C 574
McKay, Walter	Nov. 20, 1923	C 763
McKelvie, J.	July 22, 1908	C 285
McKenzie, Peter	June 10, 1911	C 427
McKibben, Matthew	May 21, 1914	C 580
McKinley, John	Oct. 28, 1914	C 442
McLaren, John	May 30, 1923	C 754
McLaughlin, James	May 9, 1912	C 485
McLachlan, Alex	June 10, 1912	C 419
McLean, M. D.	Sept. 10, 1910	C 389
McLellan, William	Mar. 4, 1905	C 219
McLeod, James	July 22, 1908	C 296
McLeod, John	May 13, 1915	C 609
McMeakin, James	May 13, 1915	C 612
McMillan, D.	Sept. 10, 1910	C 363
McMillan, Edward	Oct. 31, 1912	C 493
McMillan, Neil	Nov. 15, 1917	C 654
McNay, Carmichael	July 22, 1908	C 306
McNeill, Adam L.	July 22, 1908	C 281
McNeill, Robert	Sept. 10, 1910	C 387
Meek, Matthew	May 9, 1912	C 484
Meikle, Harry Alexander	July 8, 1916	C 627
Menzies, Frederick	Dec. 14, 1920	C 704
Merrifield, George	Oct. 23, 1906	C 239
Merrifield, William	Oct. 23, 1906	C 236
Michek, John	May 21, 1914	C 563
Miles, John	June 10, 1911	C 414
Mitchell, Charles	May 1, 1909	C 322
Mitchell, Henry	Sept. 10, 1910	C 366
Monks, James	Nov. 14, 1905	C 234
Moore, George	Oct. 23, 1906	C 242
Moore, John	May 1, 1909	C 335
Moreland, Thomas	July 22, 1908	C 299
Morgan, John	July 29, 1905	C 224
Morgan, William	May 17, 1917	C 636
Morgan, Cornelius	Dec. 22, 1921	C 725
Morgan, John	June 24, 1924	C 773
Morris, David	May 9, 1912	C 472
Mottishaw, Samuel K.	Oct. 23, 1906	C 237
Murdock, Jno. Y.	May 21, 1914	C 564
Myers, Peter	Oct. 28, 1911	C 446
Nanson, T. H.	July 22, 1908	C 280
Nash, George William	May 17, 1917	C 565
Nash, George F.	Dec. 22, 1921	C 727
Nee, Wm. R.	Dec. 22, 1921	C 724
Neen, Joseph	Nov. 27, 1909	C 352
Nelson, Horatio	Oct. 1, 1907	C 263
Neilson, William	May 9, 1912	C 481
Newman, John	Oct. 14, 1914	C 603
Nicholson, James	May 9, 1912	C 469
Nimmo, James	May 9, 1912	C 461
Norris, Joshua	Oct. 28, 1913	C 557
Nuttall, Wm.	June 16, 1925	C 780
Oakes, Robert	Oct. 31, 1912	C 498
O'Brien, Charles	Nov. 27, 1909	C 349
Odgers, Eli	Jan. 21, 1913	C 523
Orr, Alexander	Oct. 28, 1911	C 434
Osborne, Hugh	Oct. 28, 1913	C 555
Oswald, Geo. L.	Sept. 10, 1910	C 370
Owen, Thomas	May 1, 1909	C 347
Park, William	Dec. 19, 1918	C 684
Parks, Alexander	Jan. 21, 1913	C 519
Parker, L.	May 1, 1909	C 341
Parkinson, James Wm.	Nov. 15, 1917	C 655
Parkinson, T.	July 22, 1908	C 289
Parkinson, Thomas	June 24, 1924	C 769
Parrott, Jas. E.	May 21, 1914	C 590
Parson, Herbert	May 13, 1915	C 621
Pearson, Jonathan	May 9, 1912	C 473
Penman, Hugh	Oct. 28, 1913	C 552
Perry, Geo. Harewood	May 17, 1917	C 643
Phillips, Richard S.	May 17, 1917	C 620
Phillips, James	Nov. 21, 1922	C 749
Pickup, A.	July 22, 1908	C 310
Picton, W.	May 1, 1909	C 333
Plank, Samuel	Nov. 14, 1905	C 233
Pollock, John	May 30, 1923	C 760
Poole, Samuel	May 27, 1913	C 536
Price, Walter	Sept. 10, 1910	C 371
Puckey, John Thomas	Dec. 19, 1918	C 687
Quayle, Alex. B.	Jan. 5, 1925	C 778
Quinn, James	Oct. 28, 1911	C 441
Quinn, John	Oct. 28, 1911	C 429
Radford, Albert	May 21, 1914	C 579
Rallison, R.	July 22, 1908	C 279
Rallison, James	May 30, 1923	C 759
Rankin, George	July 22, 1908	C 275
Rankin, Wm. Shaw	May 9, 1912	C 489
Ratcliffe, Thomas	Oct. 1, 1907	C 253
Raynor, Fred	Oct. 1, 1907	C 257
Reid, Robert	Sept. 10, 1910	C 383
Reid, Thos.	May 21, 1914	C 592
Reid, Wm.	June 10, 1911	C 403

THIRD-CLASS CERTIFICATES ISSUED UNDER "COAL-MINES REGULATION ACT FURTHER AMENDMENT ACT, 1904"—*Continued.*

Name.	Date.	No.
Reilly, Thomas	July 22, 1908	C 303
Renney, Jas.	Nov. 27, 1909	C 354
Richards, James	Nov. 1, 1907	C 249
Richards, Samuel	Oct. 23, 1906	C 244
Richardson, J. H.	Oct. 28, 1911	C 458
Rigby, John	July 29, 1905	C 225
Roberts, Arthur	June 24, 1924	C 772
Roberts, Ebenezer	May 1, 1909	C 327
Robinson, Michael	May 1, 1909	C 332
Robinson, Asa	June 16, 1925	C 787
Robson, James	June 16, 1925	C 788
Robson, Thomas	May 21, 1914	C 566
Rogers, Ellis	May 13, 1915	C 624
Roper, William	July 22, 1908	C 274
Ross, William	June 21, 1920	C 702
Rowan, Alexander	Oct. 31, 1912	C 500
Rowan, John	Oct. 14, 1914	C 602
Rowbottom, Thomas	Oct. 31, 1914	C 492
Royle, Edward	Oct. 31, 1912	C 506
Russell, Robert	Nov. 27, 1909	C 351
Rutherford, Jasper	May 17, 1917	C 614
Rutledge, Edwin	July 22, 1908	C 302
Scales, Joseph	May 17, 1922	C 738
Scott, Henry	July 22, 1908	C 294
Saunders, Eustace L.	Jan. 21, 1913	C 520
Scarpino, Francis	May 17, 1917	C 649
Seddon, James	Oct. 3, 1919	C 692
Shanks, David	Sept. 10, 1910	C 372
Sharp, James	May 1, 1909	C 325
Sharpe, Henry	June 16, 1925	C 783
Sharples, J. T.	Sept. 10, 1910	C 380
Shea, Thomas J.	Dec. 22, 1921	C 722
Shearer, L.	May 1, 1909	C 330
Shields, Thomas	May 16, 1918	C 667
Shipley, John W.	Oct. 28, 1911	C 456
Shooter, Joseph	Oct. 1, 1907	C 261
Shortman, J.	May 1, 1909	C 331
Simister, J. H.	Nov. 27, 1909	C 353
Simister, W.	May 1, 1909	C 334
Sim, James	Dec. 14, 1920	C 711
Simms, Hubert Allan	Jan. 21, 1913	C 526
Sinclair, William	Jan. 21, 1913	C 527
Skelton, Thos.	May 1, 1909	C 344
Smith, A. E.	Sept. 10, 1910	C 367
Smellie, John	May 29, 1923	C 755
Smith, John Watterson	May 16, 1918	C 665
Smith, Joseph	Mar. 4, 1905	C 207
Smith, Richard Beveridge	Oct. 28, 1913	C 561
Smith, Thos. J.	Oct. 1, 1907	C 271
Smith, Thomas	May 9, 1912	C 486
Smith, Thomas	Dec. 14, 1920	C 705
Snow, Aubrey	June 15, 1918	C 675
Sopwith, Reginald Scott	Jan. 21, 1913	C 512
*Sparks, Edward	Oct. 1, 1907	C 255
Spencer, G.	May 1, 1909	C 329
Spruston, R. L.	Nov. 27, 1909	C 355
Spruston, Thomas A.	Mar. 4, 1905	C 206
Stafford, M.	Sept. 10, 1910	C 382
Starr, Wallace	May 9, 1912	C 488
Staton, Edward	May 21, 1914	C 581
Steele, Walter	Oct. 28, 1911	C 439
Stewart, George	May 27, 1913	C 534
Stewart, James M.	Oct. 23, 1906	C 240
Stewart, James B.	June 16, 1925	C 785
Stobbart, David	June 16, 1925	C 781
Stockwell, William	Oct. 23, 1906	C 238
Stone, Wm. C.	June 21, 1921	C 714
Strachan, John	Oct. 14, 1914	C 604
Strang, James	May 13, 1915	C 614
Strang, Thomas	June 10, 1911	C 400
Strang, Wm.	June 10, 1911	C 395
Strang, William L.	Jan. 5, 1925	C 777
Sutherland, John	May 27, 1913	C 545
Sweeney, John	May 17, 1922	C 735
Taylor, Charles M.	Mar. 4, 1905	C 213
Taylor, Hugh	Jan. 21, 1913	C 530
Taylor, James	May 21, 1914	C 567
Taylor, Jonathan	Dec. 19, 1918	C 680
Taylor, J. T.	Oct. 28, 1911	C 447
Taylor, Leroy	Sept. 10, 1910	C 381
Taylor, Robert	June 21, 1920	C 695
Taylor, Thomas	May 21, 1914	C 577
Tennant, Joseph	June 24, 1924	C 770
Thacker, Geo.	May 27, 1913	C 537
Thomas, Thomas	Sept. 10, 1910	C 365
Thomas, John B.	Nov. 14, 1905	C 231
Thomas, Joseph	Mar. 4, 1905	C 220
Thomas, Warriett	Oct. 1, 1907	C 273
Thomason, Charles	Nov. 15, 1917	C 657
Thompson, Charles	June 24, 1924	C 765
Thompson, Thomas	Oct. 1, 1917	C 267
Thompson, John	Oct. 31, 1912	C 509
Thompson, Joseph	Oct. 1, 1907	C 269
Thomson, Duncan	Mar. 4, 1905	C 218
Tolley, John	Dec. 19, 1918	C 678
Touhey, William	May 27, 1913	C 547
Travis, Joseph	June 21, 1920	C 699
Tully, Thomas	May 9, 1912	C 468
Tune, Elijah	May 9, 1912	C 476
Unsworth, John	June 16, 1925	C 784
Vardy, Robt.	May 21, 1914	C 570
Vaughan, John Henry	Oct. 28, 1913	C 560
Vincent, Thomas C.	Nov. 21, 1922	C 745
Walker, George	July 8, 1916	C 633
Walker, Jas. Alexander	Oct. 31, 1912	C 496
Walker, Robert C.	May 17, 1922	C 728
Walker, Wm.	May 21, 1914	C 586
Wallace, Fred	Oct. 1, 1907	C 260
Walls, John	Dec. 14, 1920	C 710
Warburton, Ernest L.	June 10, 1911	C 399
Ward, Ernest Hedley	May 17, 1917	C 641
Wardrop, James	Oct. 31, 1912	C 504
Watson, Adam G.	Mar. 4, 1905	C 212
Watson, Arthur W.	May 27, 1913	C 535
Watson, George	July 22, 1908	C 288
Watson, Joseph	Jan. 21, 1913	C 515
Watson, William	Oct. 22, 1906	C 246
Watson, William	May 17, 1917	C 645
Watson, John	May 17, 1922	C 743
Weaver, William	Nov. 17, 1922	C 748
Webb, Herbert	Oct. 28, 1911	C 457
Webster, James Stewart	Dec. 19, 1918	C 685
Weeks, John	Mar. 4, 1905	C 214
West, James Gloag	May 16, 1918	C 676
Whalley, William	Dec. 19, 1918	C 686
White, James	Oct. 31, 1912	C 499

* C 314 issued in lieu of C 255 destroyed by Fernie fire.

THIRD-CLASS CERTIFICATES ISSUED UNDER "COAL-MINES REGULATION ACT FURTHER AMENDMENT ACT, 1904"—*Continued.*

Name.	Date.	No.	Name.	Date.	No.
White, John	Oct. 22, 1906	C 245	Winstanley, H.	July 22, 1908	C 283
Wilkinson, Edward	Oct. 28, 1911	C 438	Wintle, Thomas A.	July 29, 1905	C 222
Williams, John Sam.	June 10, 1911	C 404	Witherington, George	Oct. 28, 1913	C 554
Williams, Watkin	June 22, 1908	C 301	Wood, Thos. James	Oct. 31, 1912	C 491
Wilson, Joseph	June 24, 1924	C 767	Worthington, J.	July 22, 1908	C 295
Wilson, Robinson	June 10, 1911	C 397	Wright, John	May 21, 1914	C 593
Wilson, Thomas M.	Oct. 1, 1907	C 272	Wright, Robert	May 21, 1914	C 589
Wilson, William	Oct. 1, 1907	C 262	Wright, William	Jan. 21, 1913	C 522
Wilson, William	May 17, 1917	C 674	Yates, Frank	May 17, 1922	C 732
Winstanley, Robert	Nov. 21, 1922	C 747	Yeowart, Hudson	June 24, 1924	C 771
Winstanley, Oliver	May 17, 1922	C 741	Young, Alexander	May 16, 1918	C 666

COAL-MINE OFFICIALS.

Third-class Certificates issued under "Coal-mines Regulation Act Further Amendment Act, 1904," sec. 38, subsec. (2), in exchange for Certificates issued under the "Coal-mines Regulation Act Amendment Act, 1901."

Name.	Date.	No.	Name.	Date.	No.
Adam, Robert	Oct. 12, 1904	C 42	Gould, Alfred	April 17, 1906	C 112
Addison, Thos.	Dec. 10, 1904	C 52	Green, Francis	Oct. 11, 1904	C 38
Aitken, James	Oct. 24, 1904	C 44	Handlen, Jas.	June 16, 1904	C 122
Allsop, Harry	Oct. 11, 1904	C 34	Harmison, Wm.	Feb. 3, 1905	C 65
Ashman, Jabez	Feb. 5, 1907	C 131	Hescott, John	Jan. 16, 1905	C 62
Auchinvole, Alex	Mar. 29, 1905	C 89	Hoggan, Wm.	June 6, 1911	C 134
Barclay, Andrew	April 27, 1904	C 19	John, David	Nov. 8, 1904	C 49
Barclay, James	April 27, 1904	C 20	*John, Evan	July 25, 1916	C 140
Barclay, John	April 17, 1905	C 111	Johnson, Geo.	May 9, 1904	C 124
Bickle, Thos.	Oct. 11, 1904	C 37	Johnson, Wm. R.	Mar. 1, 1905	C 75
Bowie, James	May 13, 1905	C 116	Jones, Evan	April 30, 1913	C 136
Briscoe, Edward	Oct. 10, 1906	C 129	Lander, Frank	Jan. 9, 1905	C 61
Campbell, Dan	Mar. 29, 1905	C 93	Lanfear, Herbert	Jan. 27, 1905	C 63
Carr, Jos. E.	Oct. 11, 1904	C 36	Lewis, Thos.	Oct. 11, 1904	C 35
Carroll, Harry	Mar. 29, 1905	C 98	Marsden, John	May 3, 1904	C 21
Clarkson, Alexander	April 27, 1904	C 18	Miard, Harry E.	Mar. 3, 1905	C 76
Collishaw, John	Feb. 7, 1905	C 68	Middleton, Robt.	Feb. 11, 1905	C 71
Comb, John	Mar. 23, 1904	C 2	Miller, Thos. K.	Feb. 21, 1905	C 74
Courtney, A. W.	Nov. 2, 1904	C 45	McKenzie, John R.	Oct. 12, 1904	C 40
Crawford, Frank	April 6, 1904	C 7	McKinnon, Arch'd	April 3, 1905	C 102
Daniels, David	April 27, 1904	C 12	McMillan, Peter	Mar. 29, 1905	C 94
Davidson, David	April 3, 1905	C 106	McMurtrie, John	Mar. 29, 1905	C 96
Davidson, John	Mar. 29, 1905	C 87	Moore, Wm. H.	June 17, 1905	C 119
Devlin, Henry	Oct. 12, 1904	C 41	Morris, John	Dec. 27, 1904	C 57
Dobbie, John	Nov. 27, 1905	C 126	Myles, Walter	April 3, 1905	C 100
Dudley, James	Mar. 22, 1905	C 114	Nash, Isaac	June 1, 1904	C 120
Duncan, Thomas	Aug. 29, 1906	C 128	Neave, Wm.	Oct. 12, 1904	C 43
Dunlap, Henry	Nov. 21, 1904	C 51	Nelson, James	April 27, 1904	C 16
Dunn, Geo.	Dec. 19, 1904	C 56	Nimmo, Richard E.	April 18, 1911	C 133
Dunsmuir, John	Mar. 29, 1905	C 90	O'Brien, Geo.	Feb. 6, 1905	C 66
Eccleston, Wm.	Mar. 15, 1905	C 80	Pearse, Thomas W. H.	April 14, 1916	C 138
Fagan, David	April 6, 1905	C 109	Power, John	Sept. 8, 1920	C 142
Farquharson, John	April 27, 1904	C 17	Price, Jas.	Nov. 8, 1904	C 50
Findlayson, James	June 6, 1904	C 25	Rafter, Wm.	Mar. 29, 1905	C 95
Fulton, Hugh T.	April 3, 1905	C 105	Reid, James	Mar. 23, 1904	C 1
Gibson, Edward	May 30, 1905	C 118	Richards, Thos.	April 27, 1904	C 14
Gilchrist, Wm.	Mar. 29, 1905	C 85	Ross, John	April 3, 1905	C 101
Gillespie, Hugh	April 6, 1904	C 8	Roughead, George	Jan. 30, 1907	C 130
Gillespie, John	April 6, 1904	C 5	Ryan, John	Dec. 28, 1904	C 59

* Issued in lieu of No. C 132, lost.

THIRD-CLASS CERTIFICATES ISSUED UNDER "COAL-MINES REGULATION ACT FURTHER AMENDMENT ACT, 1904"—*Continued.*

Name.	Date.	No.	Name.	Date.	No.
Sanders, John W.	April 3, 1905	C 107	Strang, James	April 27, 1904	C 10
Shenton, Thos. J.	July 25, 1904	C 30	Sullivan, John	July 4, 1916	C 139
Shepherd, Henry	June 13, 1904	C 26	Summers, Joseph	May 17, 1920	C 141
Smith, Geo.	Mar. 29, 1905	C 84	Thomas, John	Mar. 29, 1905	C 97
Somerville, Alex.	Mar. 24, 1904	C 3	Vass, Robt.	Dec. 12, 1904	C 53
Stauss, Chas. F.	Feb. 9, 1905	C 69	Vater, Charles	April 6, 1904	C 66
Steele, Jas.	Mar. 29, 1905	C 92	Webber, Chas.	Sept. 13, 1904	C 32
Steele, John	June 4, 1913	C 4	Webber, Charles F.	Sept. 13, 1904	C 33
Stewart, Duncan H.	Mar. 28, 1904	C 137	Whiting, Geo.	May 29, 1905	C 117
Stewart, John	April 3, 1904	C 104	Wilson, Austin	Feb. 7, 1905	C 67
Stewart, Daniel W.	May 16, 1904	C 23	Wilson, Thos.	April 27, 1904	C 11
Stoddart, Jacob	Feb. 21, 1905	C 73	Woodburn, Moses	Mar. 29, 1905	C 83
Strachan, Robt.	April 27, 1904	C 15	Yarrow, Geo.	Nov. 3, 1904	C 46

MINE SURVEYOR CERTIFICATES ISSUED UNDER THE "COAL-MINES REGULATION ACT AMENDMENT ACT, 1919."

Name.	Date.	No.	Name.	Date.	No.
Anderson, Harry C.	May 19, 1922	59	MacDonald, John	May 19, 1922	46
Baile, Wynne Jeffreys	Oct. 3, 1919	16	Miard, Harry Ernest	Oct. 3, 1919	2
Bowerman, Everard S.	Dec. 14, 1920	39	McCulloch, Robert	Oct. 3, 1919	6
Boyce, Joseph Patrick	Oct. 3, 1919	5	Owen, Wm. Arthur	Oct. 3, 1919	10
Caufield, Bernard	May 19, 1922	54	Priest, Elijah	May 19, 1922	53
Corbett, Garnett S.	May 19, 1922	49	Rafter, Wm.	May 19, 1922	51
Cox, Richard	May 19, 1922	57	Reger, Frederick Wm.	Oct. 3, 1919	7
Crosscombe, James S.	May 31, 1923	60	Richards, Chas. Clifton	Oct. 3, 1919	19
Daniell, Geo. W. B.	Oct. 3, 1919	29	Ridley, James	Oct. 3, 1919	18
Davis, Gerald D.	Oct. 3, 1919	28	Roaf, Jos. R.	Oct. 3, 1919	14
Delaney, James	Oct. 3, 1919	21	Richards, James A.	Oct. 3, 1919	15
Dickson, James	Oct. 3, 1919	3	Scott, Thos. Wright	Oct. 3, 1919	4
Devlin, Henry	May 19, 1922	44	Strachan, Robert	June 21, 1920	36
Drewry, Wm. Stewart	May 19, 1922	56	Spruston, Thos. A.	May 19, 1922	52
Freeman, Harry N.	May 19, 1922	49	Strachan, Robert	May 19, 1922	45
Garman, Maurice W.	Oct. 3, 1919	11	Sandland, Joseph	May 31, 1923	61
Gregory, P. W.	Nov. 17, 1919	32	Stewart, R. T.	Nov. 17, 1923	62
Graham, Charles	May 19, 1922	50	Townsend, Neville F.	Nov. 17, 1919	31
George, Frank J.	May 19, 1922	48	Vallance, Wm. Dixon	Oct. 3, 1919	8
Hargreaves, James	Nov. 29, 1920	33	Verkirk, Lucas	June 21, 1921	42
Hepburn, James T.	Dec. 14, 1920	37	Waddington, Geo. W.	June 21, 1920	35
Holdsworth, William	Oct. 3, 1919	9	Wark, Samuel David	Oct. 3, 1919	20
Hughes, Edward	Dec. 14, 1920	38	White, Harold	Oct. 3, 1919	25
Hunter, George	Oct. 3, 1919	30	Wilson, R. Robinson	Oct. 3, 1919	12
Howden, Archibald	May 19, 1922	55	Wilson, Arthur Rupert	Oct. 3, 1919	13
Jackson, Thos. R.	May 19, 1922	43	Wilson, Chas. Jas.	Oct. 3, 1919	22
King, Alfred Geo.	Oct. 3, 1919	27	Wilson, Hartley Paul	Oct. 3, 1919	24
Lancaster, Peter	Oct. 3, 1919	23	Wilton, Douglas D.	May 19, 1922	59
Lauderbach, Wilfrid P.	June 16, 1925	63	Wilkie, Octavius B. N.	Oct. 3, 1919	26
Lindoe, Luke	June 21, 1921	41	Wilkinson, George	Oct. 3, 1919	1
Lymn, Albert Crompton	Oct. 3, 1919	17	Wright, Austin	Dec. 14, 1920	40

LIST OF ACCIDENTS IN B.C. COLLIERIES, 1925.

(Reported as required by Section 71, "Coal-mines Regulation Act.")

VANCOUVER ISLAND, NICOLA-PRINCETON, AND NORTHERN INSPECTION DISTRICTS.

REPORTED BY HENRY DEVLIN, T. R. JACKSON, JAS. DICKSON, H. E. MIARD, J. G. BIGGS, AND T. J. SHENTON, INSPECTORS.

No.	Colliery.	Date.	Name.	Occupation.	Details.
1	No. 1 mine (W.F.C.)	Jan. 19	Francis Green	Timberman	Fractured leg, caused when struck by timber.
2	No. 1 mine (W.F.C.)	Aug. 14	Frank Jaynes	Miner	Femur of right leg broken by falling rock and coal.
3	No. 1 mine (W.F.C.)	Sept. 8	Anthony Septav	Brusher	Compound fracture of tibia, left leg, when struck by piece of rock.
4	No. 1 mine (W.F.C.)	Oct. 19	William Mills	Miner	Left leg fractured and body bruised when piece of rock fell.
5	Reserve mine (W.F.C.)	Feb. 17	Harold E. Smith	"	Shoulder-blades and two ribs on right side fractured when slipping from car on to rail.
6	Reserve mine (W.F.C.)	July 6	George Scales	Tracklayer	Fatally injured when struck on head by swinging rail.
7	Reserve mine (W.F.C.)	" 23	Constantine Moser	Miner	Right arm fractured and collar-bone fractured when struck by piece of rock.
8	Reserve mine (W.F.C.)	Aug. 28	Joseph Rintoul	Driver	Back bruised, vertebræ fractured, when jammed against stringer.
9	Reserve mine (W.F.C.)	Nov. 19	John Neil	Blacksmith	Right femur, right leg, fractured when falling from ladder on to tracks below.
10	Reserve mine (W.F.C.)	Dec. 4	John Droffie	Miner	Fracture of collar-bone, left side, when struck by post which was knocked out by falling coal.
11	Wakesiah mine (W.F.C.)	May 6	Walter P. Clark	"	Fatally injured by fall of rock and timbers.
12	Wakesiah mine (W.F.C.)	" 21	John Millburn	Driver	Right wrist fractured when squeezed between car and prop.
13	Wakesiah mine (W.F.C.)	Aug. 27	Joseph Salmon	Machine-runner	Left arm and leg badly bruised when piece of rock rolled from face.
14	Wakesiah mine (W.F.C.)	Sept. 10	William Logan	Miner	Instantly killed when coal from face fell, crushing his head.
15	Wakesiah mine (W.F.C.)	Nov. 11	William Gilmour	Rope-rider	Left leg fractured when jammed between empty trip and siding.
16	No. 1, Well. Exten. (C.C. (D.), Ltd.)	Sept. 8	William Noye	Tracklayer	Compressed fracture of lumbar vertebræ when struck between shoulders by piece of shale.
17	No. 2, Well. Exten. (C.C. (D.), Ltd.)	Jan. 27	Robert Towers	Miner	Broken fifth rib, right side, when struck by piece of cap-rock.
18	No. 2, Well. Exten. (C.C. (D.), Ltd.)	May 15	Peter Whiskers	"	Fatally injured by fall of rock.
19	No. 2, Well. Exten. (C.C. (D.), Ltd.)	July 21	David Kerr	"	Slipping on floor, right tibia was broken.
20	No. 2, Well. Exten. (C.C. (D.), Ltd.)	Nov. 2	Daniel Sarland	"	Fractured ribs when struck by timbers, knocking him against car.
21	No. 5, S. Wellington (C.C. (D.), Ltd.)	Oct. 28	Peter Cameron	"	Fractured back and ribs when piece of rock fell. Subsequently died from injuries on October 31st, 1925.
22	No. 4, Comox (C.C. (D.), Ltd.)	July 22	Irving Morgan	Driver	Fractured femur caused when block swung around and struck him.
23	No. 4, Comox (C.C. (D.), Ltd.)	Sept. 18	John McNeil	Motorman	Fractured left tibia and fibula when his leg was jammed between bumpers of loaded and empty cars.
24	No. 1 mine (G.C.M.S. & P. Co.)	Mar. 20	Morris Daye	Miner	Ribs and vertebræ fractured when struck by piece of cap-rock.
25	No. 1 mine (G.C.M.S. & P. Co.)	July 14	Joseph Lavin	Shiftboss	Right knee and ankle fractured. Compound fracture left leg. Scalp wounds, fractured ribs left side, caused when jumping off car slipping, and being caught between wheels. Subsequently died of injuries.
26	No. 1 mine (E. W. Coal Co., Ltd.)	Aug. 21	Charles Webber	Fireboss	Broken leg and injured jaw when shot went off, causing rock to fall.
27	Lantzville mine (Nanoose-Well. Col.)	" 26	William Dixon	Pusher	Simple fracture right femur and cut on right side of head behind ear when caught between post and car.
28	Lantzville mine (Nanoose-Well. Col.)	Oct. 5	William Clark	Miner	Back badly bruised by fall of coal from the side.
29	No. 4 mine (Coalmont Col., Ltd.)	Dec. 4	H. Ruckledge	"	Right wrist fractured when slipping and falling on same.
30	No. 3 mine (Coalmont Col., Ltd.)	" 5	H. J. Keenan	Driver	Right arm crushed above elbow when caught between the top of the car and stringer.
31	Goat Creek (Telkwa Col., Ltd.)	Feb. 4	Allen Lefor	"	Left foot fractured when piece of rock slid down on it.

EAST KOOTENAY INSPECTION DISTRICT.

REPORTED BY ROBT. STRACHAN AND JOHN MACDONALD, INSPECTORS.

No.	Colliery.	Date.	Name.	Occupation.	Details.
32	No. 1 East, C.C..... (C.N.P.C. Co.)	Feb. 6	George Larner.....	Timberman ..	Ribs on right side fractured when thrown against edge of car.
33	No. 1 East, C.C..... (C.N.P.C. Co.)	" 16	J. Reszo.....	Driver	Left leg fractured when struck by car.
34	No. 1 East, C.C.... (C.N.P.C. Co.)	June 16	Archie Gilmour.....	Helper	Fractured base of skull and body badly bruised when squeezed between car and post.
35	No. 2, C.C ..... (C.N.P.C. Co.)	May 18	Alexander Phillips....	Miner	Left leg fractured below knee when struck by piece of rock.
36	No. 2, C.C ..... (C.N.P.C. Co.)	Aug. 17	Frederick Atherton...	Rope-rider ...	Fractured left leg, above ankle, when car ran over it.
37	No. 3, C.C. ..... (C.N.P.C. Co.)	Feb. 12	Tony Pisciol.....	Brusher.....	Comminuted fracture of right pelvis when struck by timber.
38	C.C. Collieries..... (C.N.P.C. Co.)	July 29	L. Bonutto	Miner	Two ribs fractured by fall of coal at face.
39	No. 3, Michel..... (C.N.P.C. Co.)	Oct. 7	J. Liska	"	Leg fractured when struck by car when it jumped the track.
40	No. 3, Old Michel... (C.N.P.C. Co.)	Feb. 24	G. E. Jackson	"	Hand crushed when wheel of car ran over it.
41	No. 8, Michel..... (C.N.P.C. Co.)	Jan. 5	Robt. Myles	Labourer.....	Back injured when struck by timbers.
42	No 8, Michel..... (C.N.P.C. Co.)	Aug. 26	J. Valanta.....	Driver	Fractured left tibia, bruised when car ran over leg.
43	No. 8, Michel..... (C.N.P.C. Co.)	Dec. 11	John Josagi	Boy driver....	Crushed finger, second joint, when caught between cars.
44	Corbin mine ..... (Corbin Coals, Ltd.)	Oct. 15	John Swallow	Labourer.....	Cheeks, face, and eyes burned when valve was opened and drum solution rushed out.

LIST OF ACCIDENTS IN METALLIFEROUS MINES, 1925.

(Reported as required by Section 19, "Metalliferous Mines Regulation Act.")

NORTHERN, SOUTHERN COAST, AND VANCOUVER ISLAND INSPECTION DISTRICTS.

REPORTED BY T. J. SHENTON AND JAS. DICKSON, INSPECTORS.

No.	Mine.	Date.	Name.	Occupation.	Details.
1	Pugsley (Belmont-Surf Inlet Mining Co.)	April 3	J. Butkovitch	Miner	Right femur fractured when ladder slipped.
2	Outsider (Granby C.M.S. & P. Co. Ltd.)	May 30	Murdo McLeod	Trammer	Fractured pelvis, caused when jammed by horse against side of train.
3	Duthie (Duthie Mines, Ltd.)	Aug. 27	Edward Grice	"	Second finger on right hand fractured when pinned between chute and car.
4	Premier (Premier Gold Mining Co., Ltd.)	Oct. 26	Herbert Bedore	Brakeman	Badly crushed when caught between car and chute.
5	Victoria (Britannia M. & S. Co., Ltd.)	Jan. 17	Nick Bogdnovich	Timberman	Left hand crushed by fall of rock.
6	Ditto	" 17	S. Smith	Timberman's helper	Fracture of lower end of left fibula, caused by fall of rock.
7	"	" 17	A. Herkes	Mucker	Fractured left fibula and many small cuts and bruises over body, caused by fall of rock.
8	"	" 18	W. Fraser	Miner	Fell from plank on to end of square timber, causing fractured rib.
9	"	Mar. 19	Jack Mondini	"	Right ankle fractured when jammed between column-bar and rock.
10	"	July 14	Emil Kaski	"	Fatally injured when falling down chute on to muck-pile.
11	Fairview (Britannia M. & S. Co., Ltd.)	Mar. 10	Joe Plecas	Trammer	Instantly killed when charge exploded.
12	Ditto	" 10	L. Mina	Motorman	Face, arms, and chest badly lacerated, right eye gone, left one badly injured, caused when charge exploded.
13	"	" 11	A. MacDonald	Brakeman	Compound fracture of right leg below knee when caught between running-board of motor and sidewalk.
14	"	Sept. 29	Carl Anderson	Miner	Simple fracture of right leg, caused when large piece of rock fell from roof.
15	"	Oct. 15	S. Ashton	Skip-tender	Compound fracture of left leg when struck by wall-plate when he fell down on skip.
16	"	Nov. 18	E. Plecas	Trammer	Right foot badly crushed when caught between two motors which collided.

EAST KOOTENAY AND WEST KOOTENAY AND BOUNDARY INSPECTION DISTRICTS.

REPORTED BY ROBERT STRACHAN AND H. H. JOHNSTONE, INSPECTORS.

17	Sullivan (Cons. M. & S. Co.)	Jan. 14	Ivar Larsen	Miner	Left eye bruised when piece of steel flew up, causing loss of sight.
18	Ditto	April 2	R. Larsen	Mucker	Fractured upper right back rib, caused when slipping down chute.
19	"	" 13	M. Jurisich	"	Small toe of left foot crushed when wheel of car ran over it.
20	"	May 16	A. Bramall	"	Lower left leg fractured when falling down chute.
21	"	" 24	John MacDonald	"	Left shin-bone fractured when falling in front of moving scraper.
22	"	Aug. 3	Angus Livingstone	Miner	Fractured skull, caused when top bulk-head fell crushing his head. Fatal.
23	"	Oct. 11	G. Dell Anna	Mucker	Third finger of right hand fractured when caught between couplers.
24	"	" 21	H. Stivens	Labourer	Fractured ribs, caused by slipping into bin.
25	"	Nov. 29	Henry Paterson	Rock-house boss	Simple fracture of femur of left leg when falling from loose plank.
26	"	Dec. 14	B. Colthrop	Mucker	Left leg badly broken and crushed when struck by ore-car.
27	"	" 14	J. Sims	Labourer	Small bone of right hand fractured when caught between two draw-bar heads.
28	"	" 14	A. Toffoli	Mucker	Lower left jaw and small bone left in left hand fractured when struck by small drill which slipped down slide.
29	Highland (Cons. M. & S. Co.)	" 9	John Tonkins	Miner	Barring loose ground and fell on bar, causing puncture of abdomen.
30	Bosun (Rosebery-Surprise Co., Ltd.)	Oct. 24	P. T. Reed	Mucker	Skull fractured when he apparently fell from top of raise, causing instant death.
31	Copper Mountain (Allenby Copper Co.)	Nov. 25	O. E. Anderson	Machine-miner	Instantly killed by falling down raise.

PROSECUTIONS UNDER "COAL-MINES REGULATION ACT.

Mine and Date.	Name and Occupation.	Offence charged.	Judgment.
Crow's Nest Pass Coal Co., Ltd.—			
Michel mines	Andrew Lucodi, miner	Violation of Special Rule 114 (failed to set sprags while undermining coal)	Fined $5 and costs.
Michel mines	Andrew Trulik, miner	Ditto	Fined $5 and costs.
Michel mines	Joe Grillus, miner	Ditto	Fined $10 and costs.
Michel mines	L. Tortorelle, miner	Ditto	Fined $10 and costs.
Michel mines	A. Crimoline, miner	Ditto	Fined $10 and costs.
Canadian Collieries (D.), Ltd.—			
No. 4, Comox mine	Chung Wung, miner's helper	Violation of General Rule 9 (had a pipe in his possession underground)	Fined $10 and costs.
Western Fuel Corporation of Canada, Ltd.—			
Wakesiah mine, Jan. 16	William Baird, miner	Ditto	Fined $5 and costs.
Wakesiah mine, Jan. 16	William Hamilton, miner	Violation of General Rule 9 (had a pipe and matches in his possession underground)	Fined $10 and costs.
Wakesiah mine, Jan. 22	James Richards, miner	Violation of General Rule 12 (had two shot-holes loaded at one time)	Fined $15 and costs.
Wakesiah mine, Jan. 22	James Clark, miner	Ditto	Case dismissed.
Wakesiah mine, Jan. 22	Jas. A. Challinor, fireboss	Violation of General Rule 12 (gave detonators to miners before same were about to be used)	Case dismissed.
King & Foster Coal Co., Ltd.—			
Wellington mine, Jan. 22	S. K. Mottishaw, fireboss	Violation of General Rule 12 (did not examine for gas before firing shot)	Fined $50 and costs.

PROSECUTIONS UNDER "METALLIFEROUS MINES REGULATION ACT."

Mine and Date.	Name and Occupation.	Offence charged.	Judgment.
Rosebery-Surprise Mining Co., Ltd.—			
Bosun mine, Nov. 6	J. P. MacFadden, manager	Violation of sec. 31, Rule 21 (failing to maintain platforms on manway)	Fined $5 and costs.
Bosun mine, Nov. 6	J. P. MacFadden, manager	Violation of sec. 31, Rule 25 (failure to fence top of mill-hole or winze)	Charge withdrawn.
Bosun mine, Dec. 9	J. P. MacFadden, manager	Violation of sec. 31, Rule 3 (keeping excess explosives inside of mine)	Fined $5 and costs.
Bosun mine, Dec. 9	J. P. MacFadden, manager	Violation of sec. 31, Rule 22 (failure to closely cover platforms on manway)	Fined $5 and costs.

METALLIFEROUS MINES SHIPPING IN 1925.

NORTH-WESTERN DISTRICT (No. 1).

ATLIN MINING DIVISION.

Mine or Group.	Locality.	Owner or Agent.	Address.	Character of Ore.
Engineer	Atlin	Engineer Gold Mines, Ltd.	Engineer	Gold, silver.
Cherokee	Atlin	J. M. Ruffner	Atlin	Silver, gold, lead.

SKEENA MINING DIVISION.

Belmont-Surf Inlet	Surf inlet	Belmont-Surf Inlet Mines, Ltd.	Surf Inlet	Gold, silver, copper.

NASS RIVER MINING DIVISION.

Esperanza	Kitsault river	R. Armour	Anyox	Silver, gold, lead.
Golskeish	Anyox	Granby Cons. M. S. & P. Co.	Anyox	Gold, silver.
Hidden Creek	Anyox	Granby Cons. M. S. & P. Co.	Anyox	Silver, copper, gold.
Wolf	Kitsault river	John Stark	Alice Arm	Silver, gold, lead.

PORTLAND CANAL MINING DIVISION.

Goldie	Cascade river	W. R. Toeth	Stewart	Silver, lead, zinc.
Bayview	Bear river	Bayview Mining Co.	410 Seymour St., Vancouver	Silver, zinc, lead.
Dandy	Glacier creek	Victoria Mines, Ltd.	Victoria	Gold, silver, lead, zinc.
Indian	Cascade river	Indian Mines Corporation, Ltd.	Stewart	Lead, zinc, silver, gold.
Outsider	Portland canal	Granby Cons. M. S. & P. Co.	Anyox	Copper, gold.
Porter Idaho	Glacier creek	Clay Porter	Stewart	Silver, lead, gold.
Premier	Cascade river	Premier Gold Mines, Ltd.	Premier	Silver, gold, lead.
Silverado	Stewart	Silverado Mines, Ltd.	Stewart	Silver, copper.
Spider	Salmon river	B.C. Bonanza Mines, Ltd.	Granville St., Vancouver	Silver, lead, zinc, gold.
Silver Crest	Salmon river	Silver Crest Mines, Ltd.	640 Hastings St., Vancouver	Silver, zinc, lead.
Terminus	Bear river	Gillespie, Hart & Todd	Victoria	Silver, zinc, lead.

NORTH-EASTERN DISTRICT (No. 2).

OMINECA MINING DIVISION.

Henderson	Hudson Bay mountain	Duthie Mines, Ltd.	Smithers	Silver, lead, gold.
Silver Cup	Nine-mile mountain	L. W. Patmore	Prince Rupert	Silver, lead.
Victory	Hudson Bay mountain	Donald Simpson	Smithers	Silver, lead, gold.
Mohawk	Four-mile Mountain	W. S. Harris	New Hazelton	Silver.

CENTRAL DISTRICT (No. 3).

LILLOOET MINING DIVISION.

Pioneer	Cadwallader creek	David Sloan	Shalalth	Gold.

NICOLA MINING DIVISION.

Vimy Ridge	Merritt	Merritt Mines, Ltd.	Standard Bank Bldg. Vancouver	Copper, silver.

YALE MINING DIVISION.

Georgia No. 2.	Siwash creek	Green Hick	Laidlaw	Gold.

SOUTHERN DISTRICT (No. 4).

GREENWOOD MINING DIVISION.

Mine or Group.	Locality.	Owner or Agent.	Address.	Character of Ore.
Beaver	Beaverdell	Beaver Mines, Ltd	Beaverdell	Silver, lead.
Bell	Beaverdell	McIntosh and Lee	Beaverdell	Silver, lead, gold.
Bounty	Beaverdell	S. B. Davis	Beaverdell	Silver, lead.
Crescent	Greenwood	J. H. Duhamel	Greenwood	Silver, lead, gold.
Elkhorn Fraction	Greenwood	R. D. McKenzie	Greenwood	Silver, gold, lead.
Enterprise	Greenwood	J. H. Duhamel	Greenwood	Silver.
Helen	Greenwood	H. G. Wilson	Cedar St., Spokane	Silver, lead, gold.
Imperial	Rock creek	J. W. Clark	Greenwood	Silver, gold, lead.
Prince Henry	Greenwood	G S. Walters	Greenwood	Silver, gold, lead.
Sally	Beaverdell	H. B. Morley	Penticton	Silver, lead, gold.
Strathmore	Greenwood	G. S. Walters	Greenwood	Silver, lead, gold.
Tiger	Beaverdell	W. Law	Wilmington, Cal.	Silver.

GRAND FORKS MINING DIVISION.

Bonanza Fraction	Grand Forks	R. J. Gardner	Grand Forks	Silver, lead.
Carlton	Grand Forks	Hugh Breakell	Paulson	Silver, lead.

OSOYOOS MINING DIVISION.

Horn Silver	Similkameen	R. C. McDougal	Similkameen	Silver, gold.
Nickel Plate	Hedley	Hedley Gold Mining Co	Hedley	Gold, silver, arsenic.

SIMILKAMEEN MINING DIVISION.

Copper Mountain	Allenby	Allenby Copper Co	Allenby	Silver, gold, copper.

EASTERN DISTRICT (No. 5).

WINDERMERE MINING DIVISION.

Silver King	Toby creek	Windermere Mining Co	Bank of Nova Scotia Bldg., Vancouver	Lead, silver.
Paradise	Spring creek	R. R. Bruce	Invermere	Silver, lead.
White Cat	Slade creek	J. C. Pitts	Invermere	Silver, lead.

FORT STEELE MINING DIVISION.

Comet	Sand creek	J. D. Simmons	Elko	Copper, silver.
Sullivan	Mark creek	Consolidated M. & S. Co	Kimberley	Lead, zinc, silver.

AINSWORTH MINING DIVISION.

Albion	Ainsworth	Leo Mining Co	Paulson Building, Spokane	Silver, lead.
Blue Bell	Riondel	S. S. Fowler	Riondel	Lead, zinc, silver.
Cork Province	Keen creek	W. Zwicky	Kaslo	Lead, zinc, silver.
Highland	Ainsworth	Consolidated M. & S. Co	Ainsworth	Lead, zinc, silver.
Liberty	Zwicky	W. Y. Williams	Spokane City Club, Spokane	Silver, lead.
Silver Bell	Keen creek	S. H. Green	Kaslo	Silver, lead.
Silver Hoard	Cedar creek	H. Giegerich	Kaslo	Silver, lead.
Spokane Trinket	Ainsworth	Frank McCullogh	Spokane	Lead, silver.
Tariff	Ainsworth	C. E. Harmon	Ainsworth	Lead, silver.
Whitewater	Kaslo	Whitewater Mines, Ltd	Kaslo	Lead, zinc, silver, gold.
Whitewater tailings	Kaslo	M. S. Davys	Kaslo	Zinc, lead, silver.

SLOCAN MINING DIVISION.

Antoine	McGulgan basin	James Anderson	Kaslo	Zinc, silver, lead.
Apex	New Denver	A. Shilland	New Denver	Silver, lead.
Bosun	Sandon	J. P. McFadden	Sandon	Silver, zinc, lead.
Buffalo	Silverton	Buffalo Mining Co	Silverton	Silver, zinc.
Canadian	Silverton	J. M. Brandon	Silverton	Lead, silver.

EASTERN DISTRICT (No. 5)—*Continued.*

SLOCAN MINING DIVISION—*Continued.*

Mine or Group.	Locality.	Owner or Agent.	Address.	Character of Ore.
Corinth	Sandon	A. J. Murphy	Sandon	Silver, lead.
Galena Farm	Silverton	Clark Bros.	Old National Bank Building, Spokane	Silver, zinc, lead.
Hewitt	Silverton	M. S. Davys	Kaslo	Silver, zinc, lead.
Lucky Jim	Zincton	Lucky Jim Lead and Zinc Co.	605 Empire State Building, Spokane	Zinc, lead, silver, gold.
Lucky Thought	Silverton	M. S. Davys	Kaslo	Zinc, lead, silver.
Mammoth	Silverton	Dennis and Wetterhouse	Silverton	Silver, lead.
McAllister	Three Forks	W. H. North	Three Forks	Silver.
Mollie Hughes	New Denver	H. Clever	New Denver	Silver, gold.
Monitor	Three Forks	J. P. McFadden	Three Forks	Zinc, lead, silver, gold.
Mountain Chief	Alamo	John Cechelero	New Denver	Silver, zinc, lead.
Mowitch	Silverton	M. McLean	Silverton	Silver.
Number One	Sandon	J. M. Harris	Sandon	Silver, lead.
Queen Bess	Alamo	John Jones	Sandon	Lead, silver.
Rambler	Rambler siding	Rambler-Cariboo Mines, Ltd.	Symes Block, Spokane	Zinc, lead, silver.
Ruth Hope	Sandon	James Anderson	Kaslo	Silver, lead, zinc, gold.
Silversmith	Sandon	C. B. White	Sandon	Silver, lead, zinc, gold.
Surprise	Sandon	J. P. McFadden	New Denver	Silver, lead, zinc.
Van Roi	Silverton	Cunningham Mines, Ltd.	Silverton	Lead, silver, zinc, gold.
Victor	Three Forks	G. A. Petty	Sandon	Silver, lead, gold.
Washington	Payne mountain	W. H. Burgess	Kaslo	Silver, lead.
Wonderful	Sandon	C. Cunningham	Kaslo	Silver, lead, zinc, gold.

SLOCAN CITY MINING DIVISION.

Anna	Springer creek	K. E. Zimmerman	Slocan	Silver.
Enterprise	Enterprise creek	P. Maguire	Slocan	Silver, zinc, lead.
L. T.	Springer creek	D. B. O'Neail	Slocan	Silver, lead.
Peg Leg	Enterprise creek	W. Hicks	Slocan	Silver, lead.
Ottawa	Springer creek	P. Maguire	Slocan	Silver.

NELSON MINING DIVISION.

Emerald	Lost creek	Arthur Lakes	Salmo	Lead, zinc, silver.
Golden Eagle	Taghum	Bert Pickering	Box 857, Nelson	Silver, lead, gold.
Gold Hill	Taghum	A. McDonald	Madden Ho., Nelson	Gold, silver.
Gold Hub	Tamarac	E. P. Haukedahl	Ymir	Gold.
Granite	Taghum	W. W. Philbrick	Kuhn Bldg., Spokane	Gold silver.
Fern	Hall	O. O. Groh	Hall, B.C.	Gold.

TRAIL CREEK MINING DIVISION.

Golden Drip	Rossland	The Manager	Rossland	Gold, silver, copper.
L.X.L.	Rossland	R. B. Shellady	Rossland	Gold, silver.
Consolidated	Rossland	Consolidated M. & S. Co.	Rossland	Gold, copper, silver.

LARDEAU MINING DIVISION.

Dunvegan	Bain creek	J. B. Rowley	Holly St., N. West	Silver, lead.

WESTERN DISTRICT (No. 6).

VANCOUVER MINING DIVISION.

Britannia	Britannia Beach	Britannia M. & S. Co.	Britannia Beach	Copper, silver, gold.

NANAIMO MINING DIVISION.

Doratha Morton	Phillips arm	Glasord Mining Corp.	Vancouver Blk., Van.	Silver, copper.

LIST OF CROWN-GRANTED MINERAL CLAIMS.

CROWN GRANTS ISSUED IN 1925.

NORTH-WESTERN DISTRICT.

Claim.	Mining Division.	Grantee.	Lot.	Acres.	Date.
Hawk	Skeena	W. Treston and David Wilson	6792R5	35.82	July 2
Anglo	Nass River	G. C. and J. W. Strombeck and A. F. Miner	934	14.27	Aug. 21
Big Strike	"	Walter Stewart Bavid, Douglas Robert Shewan, and Robert Tannahill Colquhoun	4202	51.65	Oct. 30
Bunker Hill No. 2	"	J. O. Trethewey and James Calvin	927	40.65	Aug. 19
Bunker Hill No. 3	"	" "	928	34.06	Aug. 19
Bunker Hill No. 4	"	" "	929	43.09	Aug. 19
Homestake	"	A. Davidson, A. F. Smith, and G. Pearson	2975	51.65	Oct. 13
Homestake No. 1	"	" " "	2976	50.12	Oct. 13
Homestake No. 2	"	" " "	2977	37.17	Oct. 13
Homestake No. 3	"	" " "	2978	34.50	Oct. 13
Hooter Fr	"	R. F. McGinnis	4072	34.56	June 30
June Fr	"	Silvercliff Group Mining Co., Limited	4221	18.06	Feb. 20
Lamb	"	J. W. and C. G. Strombeck and A. F. Miner	937	18.18	Aug. 21
Moose	"	J. W. Strombeck *et al*	936	36.02	Aug. 21
Speculator No. 2	"	A. B. Armstrong and J. Calvin	886	47.83	Feb. 17
Tip Top	"	H. M. Main	3981	44.44	Oct. 13
Toric	"	C. G. and J. W. Strombeck and A. F. Miner	935	29.10	Aug. 21
A. M. Fr	Portland Canal	Indian Mines Corporation, Ltd	4440	4.61	Mar. 31
Anniversary	"	Arthur Chester O'Neill and Roy Alexander Young	4410	45.65	Dec. 3
Ben Ali No. 2	"	Dunwell Mines, Ltd	4470	49.71	June 17
Big Casino	"	A. J. Martin	4259	51.65	Dec. 2
Dunwell No. 4 Fraction	"	Dunwell Mines, Ltd. (Non-Personal Liability)	4475	26.74	June 12
Gloria	"	Dunwell Mines, Ltd	4474	38.13	June 23
Golden Fraction	"	William McGrew *et al*	4118	6.01	D. 30, '24
Granby	"	V. McKenna	3239	51.65	June 17
H. & W. Fraction	"	John Hovland	4541	19 28	July 24
Hollywood No. 1	"	Hollywood Mines, Ltd. (N.P.L.)	4485	51.65	May 23
Hollywood No. 2	"	" "	4486	51.53	May 23
Hollywood No. 3	"	" "	4487	51.65	May 23
Hollywood No. 4	"	" "	4488	48.55	May 23
Hollywood No. 5	"	" "	4489	51.47	May 23
Hollywood No. 6	"	" "	4490	51.35	May 23
Hollywood No. 7	"	" "	4491	51.47	May 23
Hollywood No. 8	"	" "	4492	48.39	May 23
Hollywood No. 9	"	" "	4493	51.53	May 23
Hollywood No. 10	"	" "	4494	51.65	May 23
Hollywood No. 11	"	" "	4495	51.65	May 23
Jack of Clubs	"	A. J. Martin	4530	51.65	Dec. 2
Ketchum	"	W. Skillings	1075	51.65	May 7
L. & L. No. 1	"	L. & L. Glacier Creek Mines, Ltd	4526	29.81	Sept. 21
L. & L. No. 2	"	" "	4527	49.15	Sept. 21
L. & L. Fr	"	" "	4528	16.21	Sept. 21
Lakeview No. 1	"	Lakeview Mines, Ltd. (N.P.L.)	3598	44.89	Mar. 25
Lakeview No. 2	"	" "	3599	47.35	Mar. 25
Lakeview No. 3	"	" "	3600	30.68	Mar. 25
Little Casino	"	A. J. Martin	4532	45.13	Dec. 2
Lookout Fr	"	"	4531	41.76	Dec. 2
M. & D. No. 2	"	Dunwell Mines, Ltd	4472	45.78	June 23
Maggie Jiggs Fr	"	Indian Mines Corporation, Ltd	4442	6.76	Mar. 31
Mineral Basin	"	Wm. McGrew *et al*	4059	42.47	D. 30, '24
Mineral Basin No. 1	"	"	4060	29.81	D. 30, '24
Mineral Basin No. 2	"	"	4061	23.75	D. 30, '24
Mineral Basin Fr	"	"	4062	15.00	D. 30, '24
Mother Lode	"	H. J. Stoddart	3238	51.65	June 17
Myra	"	Dunwell Mines, Ltd	4473	37.03	June 23
O'Brien Fr	"	Indian Mines Corporation, Ltd	4441	37.91	Mar. 31
Old Timer	"	Laura McEwan *et al*	4032	25.80	Nov. 16
Ouray Fr	"	A. J. Martin	4533	29.17	Dec. 2
Railroad	"	H. J. Stoddart	3237	51.65	June 17
Silver Bell Fr	"	Lakeview (Stewart, B.C.) Mines, Ltd	3601	35.30	Mar. 25
Sunbeam Fr	"	Dunwell Mines, Ltd. (N.P.L.)	4469	39.15	June 23
Unicorn	"	J. Hovland and L. Watkins	4534	34.32	July 24
Unicorn No. 2	"	L. Watkins	4535	49.99	July 24
Unicorn No. 3	"	"	4536	43.75	July 24
Unity	"	"	4537	17.62	July 24
Victory	"	R. M. Stewart	4476	34.23	June 12
Yellowstone	"	Laura McEwan *et al*	4031	31.54	Nov. 16
Carnation	Queen Charlotte	W. C. Ditmars	71	51.31	Sept. 8
Lily	"	Robert Armstrong	66	51.65	Sept. 8
Morning Glory	"	C. J. Peter	1857	30.71	Sept. 8
Orchid	"	Samuel John Castleman	70	36.83	Sept. 8
Peach	"	R. P. McLennan	67	51.39	Sept. 8
Persiminon	"	Chas. John Peter	1859	46.02	Sept. 8
Pineapple	"	W. C. Ditmars	1806	17.80	Sept. 8
Pine Frac.	"	R. P. McLennan	95	29.50	Sept. 8

NORTH-EASTERN DISTRICT.

Claim.	Mining Division.	Grantee.	Lot.	Acres.	Date.
Avalon Frac	Omineca	John Ashman	3660	7.79	July 8
Bertha Fr	"	Dome Mountain Gold Mining Co.	2907R5	14.02	Jan. 22
Comet	"	J. Dyer	3578	45.52	Feb. 4
Dome	"	Dome Mountain Gold Mining Co., Ltd.	2903R5	51.65	Jan. 22
Eagle	"	" "	2889R5	51.60	July 22
Eagle Fr.	"	" "	2891R5	12.50	July 22
Elk	"	" "	2902R5	30.89	July 22
Freda	"	" "	2918R5	49.20	Jan. 22
Gem	"	Dome Mountain Gold Mining Co.	2896R5	51.50	Jan. 22
Grizzly	"	" "	2900R5	46.50	Jan. 22
Hawk	"	" "	2888R5	51.60	Jan. 22
Hercules	"	" "	2894R5	51.65	Jan. 22
Iron Mask	"	James Dyer	3577	50.43	Feb 4
Josie	"	Dome Mountain Gold Mining Co.	2913R5	51.65	Jan. 22
Last Chance	"	Andrew Fairbairn	3523	45.07	Jan. 7
New York	"	Dome Mountain Gold Mining Co.	2912R5	47.07	Jan. 22
No. 1	"	" "	2908R5	51.65	Jan. 22
No. 2	"	" "	2909R5	51.65	Jan. 22
No. 3	"	" "	2910R5	51.65	Jan. 22
No. 4	"	" "	2914R5	51.65	Jan. 22
No. 5	"	" "	2906R5	50.32	Jan. 22
No. 6	"	" "	2905R5	41.50	Jan. 22
Pioneer	"	" "	2895R5	50.60	Jan. 22
Porcupine	"	" "	2899R5	41.40	Jan. 22
Ptarmigan	"	" "	2893R5	51.65	Jan. 22
Raven	"	" "	2897R5	44.00	Jan. 22
Snowdrop	"	" "	2904R5	51.65	Jan. 22
Telkwa	"	" "	2915R5	31.40	Jan. 22
Tom Fr.	"	" "	2922	18.56	Jan. 22
Trail	"	" "	2919	51.65	Jan. 22
Trail Fr	"	" "	2921	40.40	Jan. 22
Triangle Fr.	"	" "	2901R5	9.85	Jan. 22
Vancouver	"	" "	2916R5	37.30	Jan. 22
Victoria Fr.	"	" "	2917R5	6.45	Jan. 22
Wallace	"	" "	2911R5	51.50	Jan. 22
Wallace Fr.	"	" "	2920	0.44	Jan. 22
Whistler	"	" "	2892R5	51.65	Jan. 22
Whistler Fr.	"	" "	2890R5	44.90	Jan. 22
Ada	Cariboo	Granite Mining Co., Ltd	8447	35.20	June 8
Conklin	"	C. J. S. Baker	2047	51.31	Mar. 5
Granite	"	Granite Mining Co., Ltd.	8741	28.31	June 8
Lucky Bill	"	B. D. Watchler	9368	37.11	May 28
Mucho Oro	"	L. Muller	10026	51.65	Sept. 18
North Point	"	Granite Mining Co., Ltd.	9373	47.20	June 8
Proserpine	"	C. J. S. Baker	430	51.28	Mar. 5
Proserpine South	"	" "	431	51.38	Mar. 5
Proserpine East	"	" "	2046	51.48	Mar. 5
Proserpine West	"	" "	2044	49.01	Mar. 5
Yankee Girl	"	Granite Mining Co., Ltd.	9374	27.29	June 8
Yankee Boy	"	J. E. Hamilton	9371	48.39	June 4

CENTRAL DISTRICT.

White Elephant	Clinton	Soda Mining & Products Co., Ltd	2305	43.22	Feb. 6
White Empress	"	E. A. Carew-Gibson	5016	51.64	April 21
Saint Paul	Lillooet	C. G. Codman	4811	49.96	Nov. 23
Santa Barbara	"	" "	4810	46.28	Nov. 23
Beta	Kamloops	Glen Iron Mining Co., Ltd.	1414	51.65	Sept. 30
Central	"	W. J. Smith *et al.*	4465	32.20	Feb. 20
Norah	"	Glen Iron Mining Co., Ltd.	1414	51.65	Sept. 30
Plato	"	W. J. Smith *et al.*	4463	44.70	Feb. 20
Skookum	"	" "	4464	51.65	Feb. 20
Skookum Boy	"	" "	4466	48.35	Feb. 20
Ensign	Nicola	J. Melville Wickenden	3836	51.65	Sept. 8
Frinsbury	"	C. O. Wickenden	3837	39.62	Sept. 8
Ingersoll	"	" "	3835	43.95	Sept. 8
Last Post	"	" "	3838	46.60	Aug. 25
Morning Glory	Vernon	A. M. Symons	786	41.40	Aug. 2

SOUTHERN DISTRICT.

Alder No. 1	Similkameen	Allenby Copper Co., Ltd	2932s	33.65	Jan. 19
Balsam No. 1	"	" "	2726s	51.65	Jan. 19
Brownie	"	Olivine Mountain Platinum Syndicate, Ltd.	1138	30.44	Feb. 26
Burr Oak No. 1	"	Allenby Copper Co., Ltd.	2937s	42.80	Jan. 19
Cameron	"	Olivine Mountain Platinum Syndicate, Ltd.	1136	22.05	Feb. 26
Cave	"	" " "	1141	41.16	Feb. 26
Columbia No. 1 Fr.	"	Allenby Copper Co., Ltd.	2930s	12.30	Jan. 19
Dogwood No. 1	"	" "	2936s	51.64	Jan. 19
Fraser No. 1	"	" "	2929s	19.34	Jan. 19

SOUTHERN DISTRICT—*Continued.*

Claim.	Mining Division.	Grantee.	Lot.	Acres.	Date.
Frances	Similkameen	Olivine Mountain Platinum Syndicate, Ltd.	1142	32.27	Feb. 26
Golden Cache Fr.	"	C. Vacher	755	33.43	July 8
Hetty	"	Olivine Mountain Platinum Syndicate, Ltd.	1139	28.10	Feb. 26
Holm	"	" " "	1140	36.42	Feb. 26
Keays	"	" " "	1137	19.36	Feb. 4
Live Oak No. 1	"	Allenby Copper Co., Ltd.	2934s	49.50	Jan. 19
Lowell No. 4 Fr.	"	" "	2630s	33.46	Jan. 19
Maple Leaf	"	H. D. Barnes	43s	51.65	June 23
Maud	"	Olivine Mountain Platinum Syndicate, Ltd.	1143	33.22	Feb. 26
Oro	"	F. H. Casorso	614	16.68	Aug. 22
Pearce No. 4 Fr.	"	Allenby Copper Co., Ltd.	2631s	10.13	Jan. 19
Poplar No. 1	"	" "	2933s	18.11	Jan. 19
Skagit No. 1 Fr.	"	" "	2629s	44.73	Jan. 19
Skagit No. 3 Fr.	"	" "	2628s	39.96	Jan. 19
Snake No. 1 Fr.	"	" "	2931s	41.19	Jan. 19
Spruce No. 1	"	" "	2627s	50.99	Jan. 19
Willow No. 1	"	" "	2935s	50.03	Jan. 19
Black Pine Fr.	Greenwood	J. H. Hallett and D. R. McEllman	1472s	12.90	Jan. 9
Butte	"	R. Denzler	1067	51.42	April 8
Fred D.	"	Robert Folvik	830	49.91	July 4
Gold Drop Fr.	"	Robert Forshaw	3154	51.28	Dec. 12
Hill Fraction	"	Ola Lofstad	2945	51.65	May 7
Keno	"	James Sutherland	2522	51.65	Nov. 12
Keno	"	E. A. Wanke	1319	37.10	July 6
No. 4	"	N. P. Casorso	1843	51.65	Jan. 22
Silver Tip	"	E. Mellrud	1154	51.65	May 1
Bonanza	Grand Forks	R. J. Gardner	1617	16.83	Nov. 12
Killarney	"	W. J. Banting	4637	51.48	Aug. 18
Lottie F.	"	David Rose	2949	51.65	Nov. 3
Thunder Hill Fr.	"	W. J. Banting	4638	0.90	Aug. 18
August	Osoyoos	S. F. Bradbury	1050	12.85	Aug. 21
Evening Star	"	"	543	0.19	Aug. 21
Something Good	"	G. R. Naden, J. J. Canefield, and J. L. White	1461	27.00	May 21

EASTERN DISTRICT.

Copper King	Fort Steele	W. S. Santo	3915	51.65	May 14
Copper Queen	"	"	3916	40.48	May 14
Faith	"	A. H. Mayland *et al.*	13080	51.65	Jan. 5
Granite	"	"	13079	51.65	Jan. 9
Hope	"	"	13078	34.29	Jan. 9
Kootenay King	"	William Myers	7789 G.1	48.38	Mar. 23
Mispah (Surf.)	"	F. R. Weekes	12434	32.18	Nov. 5
Warhorse	"	N. A. Wallinger, A. H. Mayland, M. Bennett	13077	14.84	Jan. 9
Watson	"	W. Myers	7770 G.1	38.77	Mar. 23
Centennial	Ainsworth	R. McLeod	3147	19.57	Jan. 9
Hardie	"	D. F. Strobeck and estate of J. R. Hardie	10675	40.20	May 4
Hardie Fr.	"	" " "	10677	17.80	May 4
Manganese	"	A. J. Curle	10673	51.65	Jan. 19
Manganese No. 1	"	"	10674	51.65	Jan. 19
Monarch Fr.	"	D. F. Strobeck and Ronald Hewat, Official Administrator of the estate of James Hardie, deceased	10676	31.70	May 4
Piker	"	D. P. Cosgriff	12854	51.65	D.19,'24
Roy	"	Ronald Hewat, Official Administrator of the estate of J. R. Hardie, deceased	5527	49.28	May 2
Baltimore Fr.	Slocan	E. C. Wragge	3522	50.53	Dec. 12
Fairy	"	Henry Homer Falding	4508	30.77	June 22
International Fr.	"	Howard Anderson	2834	38.43	June 23
Sultana	"	E. C. Wragge	3519	46.75	Dec. 12
Alice Murphy	Trout Lake	J. E. Leckie	4516	34.37	April 8
Black Prince	"	"	755	51.65	April 8
Cromwell No. 1	"	H. H. Armstead	13045	51.65	Sept. 8
Cromwell No. 2	"	"	13046	51.01	Sept. 8
Golden Reef	"	"	13044	41.49	Sept. 8
Lucky Three	"	J. O'Shea	4732	20.56	Mar. 17
Nelson	"	Henry H. Armstead	13050	48.59	Sept. 8
Tarzan	"	H. H. Armstead	13047	50.89	Sept. 8
Tarzan No. 1	"	"	13048	51.65	Sept. 8
Tarzan No. 2	"	"	13049	51.38	Sept. 8
Wellington	"	"	13053	51.65	Sept. 8
Agamemnon	Nelson	C. P. Hill	9710	45.10	June 22
Andromeda	"	"	9701	51.60	June 22
Argo	"	"	9703	51.60	June 22
Bunker Hill	"	Neil McColeman	10600	49.72	Sept. 16
Clarence	"	Reno Gold Mines, Ltd.	13042	51.33	May 14
Clarence Fr.	"	" "	13041	28.86	May 14
Constellation	"	C. P. Hill	9699	42.00	June 22
Dew Drop Fr.	"	N. McColeman	10578	19.73	Sept. 16
Donnybrook	"	Reno Gold Mines, Ltd.	12685	37.70	May 14
Falls No. 2	"	N. McColeman	11739	36.88	Sept. 16
Fawn Fr.	"	"	11737	4.24	Sept. 16
Gartan	"	Reno Gold Mines, Ltd.	13040	43.06	May 14
Gold Bug No. 2	"	N. McColeman	11740	51.65	Sept. 16
Golden Eagle	"	B. A. Pickering	1845A	46.92	Nov. 2

EASTERN DISTRICT—*Continued.*

Claim.	Mining Division.	Grantee.	Lot.	Acres.	Date.
Grand Union	Nelson	W. W. Ferguson	2467	42.92	Jan. 9
Great Expectations	"	C. P. Hill	9713	49.40	June 22
Greenwood	"	T. P. Moran	4788	34.88	Nov. 4
Huckleberry Finn	"	C. P. Hill	9711	50.30	June 22
Iron Cap	"	N. McColeman	10577	19.69	Sept. 16
Jack Pot Fr	"	T. P. Moran	4789	31.56	Nov. 4
Kelvin Grove	"	C. P. Hill	9712	39.20	June 22
Lorna Doone	"	Charles P. Hill	9714	51.60	June 22
Lynx	"	Reno Gold Mines, Ltd	13039	48.07	May 14
Manhattan Fr	"	" "	13038	8.08	May 14
Montana	"	C. Wallan	2349	19.78	Sept. 8
Orion	"	C. P. Hill	9700	50.10	June 22
Perseus	"	"	9702	42.70	June 22
Porcupine	"	Nels Helmer Peterson	4634	51.65	Oct. 17
Relief Frac	"	L. Matassa	2469	3.34	Jan. 9
Roughing It	"	C. P. Hill	9715	50.00	June 22
Second Relief	"	L. Matassa	2463	42.07	Jan. 9
Star Shine	"	W. W. Ferguson	2466	29.24	Jan. 9
Tom Sawyer	"	C. P. Hill	9716	45.50	June 22
Triune	"	Reno Gold Mines, Ltd	13043	44.49	May 14
United No. 2	"	N. McColeman	11738	35.42	Sept. 16
Yip Frac.	"	"	10601	2.34	Sept. 16
Alice	Lardeau	J. McGiverin Humphrey	4237	46.03	June 16
Alma No. 2	"	" "	3501	20.69	June 16
Banner	"	J. L. Pridham	3085	37.08	Nov. 27
Black Diamond	"	Arthur St. Clair Brindle	5680	51.52	April 8
Empress	"	Thos. Taylor	5671	48.16	April 8
Glenside	"	E. M. Brindle	4281	51.65	Aug. 25
Iola	"	Muriel L. Humphrey	3054	42.35	Nov. 27
Jumbo	"	Elmer H. Purdy	6938	48.79	Nov. 27
Lakeview	"	Mabel S. Brindle	6454	48.21	April 8
Mother Lode	"	Muriel L. Humphrey	1497	14.35	June 16
Nellie	"	Thos. Taylor	5670	51.53	April 8
Ogontz	"	E. M. Brindle	4282	51.65	April 9
Silver Bow	"	A. St. C. Brindle	5678	51.65	April 8
Thelma	"	Imperial Developing Syndicate, Ltd	5183	41.50	May 14
Tuscan	"	" "	5400	30.21	May 14
Wide West	"	Mable S. Brindle	6453	51.65	April 8
Camden	Trail Creek	John Tomich	1133	40.62	April 6
Freemont Fr	"	Consolidated Mining and Smelting Co. of Canada, Ltd	13115	3.63	Jan. 7
Norway	"	Cynthia Afflick	1501	51.65	April 8
Snowflake Fr	"	R. B. Shellady	13116	14.41	Jan. 7

WESTERN DISTRICT.

Champion	Nanaimo	Daisy Violet Crowe-Swords	276R1	22.50	Sept. 28
Commonwealth	"	Percy Robert Crowe-Swords	277R1	20.65	Sept. 28
Jennie B	"	R. Crowe-Swords	278R1	42.53	Nov. 28
Julie	"	"	233R1	38.84	Nov. 28
Rhoda	"	L. Manson	919	40.65	Mar. 25
Iron Cap	Alberni	T. H. Knights-Bayne	1676	40.30	Feb. 2
Saucy Boy	"	"	1674	19.10	Feb. 2
Saucy Lass	"	"	1673	13.10	Feb. 2
Saucy Lass No. 1	"	"	1675	31.80	Feb. 2
Thunderbolt	"	"	1677	30.60	Feb. 2
Thunderbolt No. 1	"	"	1678	26.30	Feb. 2
Waterfrontage	"	"	1672	51.65	Feb. 2
Big Chief	Quatsino	C. H. Erb	331	42.54	May 23
Boulder Canyon Fr	"	H. Flechsing	1562	10.95	Sept. 8
Leon	"	Leon F. Sperry	334	51.65	May 23
Little Chief	"	Nina F. Robinson	332	36.00	May 23
Mary	"	Mary Ann Sperry	333	39.00	May 23
Alpha	Victoria	Sunloch Mines, Ltd	863	51.65	May 27
Ayah	"	"	856	46.79	May 27
Beta	"	"	864	51.65	May 27
Black Bare	"	"	841	42.58	May 23
Blue Bird	"	Alice Graham Brennan	Sec. 135	51.65	Dec. 8
Dody Fr	"	Sunloch Mines, Ltd	857	47.81	May 27
Donaldson	"	Charles Victor Brennan	Sec. 144	50.75	Dec. 8
Gamma	"	Sunloch Mines, Ltd	865	51.65	May 27
Hope	"	"	853	50.98	May 27
Jack	"	C. V. Brennan	Sec. 145	51.25	Dec. 8
King	"	Sunloch Mines, Ltd	843	42.42	May 23
Morning	"	"	847	45.24	May 23
Nelson	"	"	850	51.61	May 23
Noonday	"	"	848	50.35	May 23
Olive	"	"	842	48.44	May 23
Olive Fr	"	"	854	51.49	May 27
Peggy	"	"	855	51.65	May 27
Trail	"	"	851	51.53	May 23
V. I. P. Fr	"	"	852	5.50	May 23
White Bare	"	"	840	45.77	May 23
White Rock Fr	"	"	862	31.86	May 27
Willow Grouse	"	Alice G. Brennan	Sec. 136	51.65	Dec. 8

WESTERN DISTRICT—*Continued.*

Claim.	Mining Division.	Grantee.	Lot.	Acres.	Date.
Baker	Vancouver	Britannia Mining and Smelting Co., Ltd	5064	51.65	Feb. 28
Bigotre	"	" " "	5152	51.65	Feb. 28
Blair Fr	"	" " "	5071	51.33	Feb. 28
Church	"	" " "	5151	51.55	Feb. 28
Dale Fraction	"	" " "	5065	51.47	Feb. 28
Emio Fr	"	" " "	5082	49.77	Feb. 28
Evans Fr	"	" " "	5073	47.55	Feb. 28
Foch	"	" " "	5072	47.63	Jan. 28
Fred	"	" " "	5150	51.65	Jan. 28
Golden Zone	"	" " "	5055	32.52	Feb. 28
Hood Fr	"	" " "	5075	44.03	Feb. 28
L. Y	"	B. G. Hawkins	2155	37.96	Feb. 4
Lowe Fraction	"	Britannia Mining and Smelting Co., Ltd	5070	51.34	Feb. 28
Majestic Fr	"	" " "	5060	10.45	Feb. 28
Monk Fr	"	" " "	5080	38.39	Feb. 28
Op	"	B. G. Hawkins	2149	43.13	Feb. 4
Paris	"	Britannia Mining and Smelting Co., Ltd	5066	46.03	Feb. 28
Poilon	"	" " "	5069	51.65	Feb. 28
Por	"	B. G. Hawkins	2150	51.65	Feb. 4
Robson	"	Britannia Mining and Smelting Co., Ltd	5074	50.92	Feb. 28
Royal Fraction	"	" " "	5081	51.65	Feb. 28
Safety Fr	"	B. G. Hawkins	2152	34.00	Feb. 4
Tu	"	"	2151 G. I	51.65	Feb. 4
Eureka	New Westm'r	E. R. Fitzgerald ; C. H. Ziegler, E. M. Barr, and J. Gourley	4113 G. I	43.65	July 10
Vulcan	"	Charles H. Ziegler *et al*	4114	50.96	July 10
Vulcan No. 2	"	" "	4115	35.34	July 10

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