

REVIEW OF REPORTS ON EXPLORATION - HOWE SOUND BRITANNIA PROPERTY

R. Greenwood - September 26, 1961

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Thirty three reports, catalogued in chronological order (File No.), deal with surface exploration on the Howe Sound property and adjacent areas, and some of these also touch on underground exploration. These reports are of value to the extent that they localize known mineralization and prospects, and eliminate large blocks of geologically unfavourable ground. They contribute very little to the detailed understanding of rock types or of geological structure. This review groups the reports under five geographical headings, and briefly summarizes their relevance to future exploration. The published papers by James, Irvine, and Ebbutt, dealing with the overall geological setting of the Britannia mines, are listed at the end of the attached catalog but are not summarized here.

A. Central Mine Area, and Comprehensive Reports

File No. 1: Leroy, O. E., 1908, Prelim. Report on Portion of Main Coast of B. C. and Adjacent Islands, Geol. Survey Canada (extract).

Of historical interest only.

File No. 2: Schofield, S. J., 1922, Progress Report on Examination of Britannia Mine.

A summary of the older geological theories which governed the early development of the mine. Many of the misconceptions herein became incorporated in James' Memoir and therefore persisted for many years.

File No. 5: Schofield, S. J., 1925, The Jane, the Robinson, the Fairview Subsidence, and the Fairwest (series of brief reports bound together). Expresses the opinion that the ground between Victoria and Fairwest is unfavorable because "footwall slates are absent".

File No. 11: Rogers, Mayer and Ball, 1940, Report on Mines of B. M. & S. Co.,
Britannia Beach, B. C.

This report is of value chiefly for its historical summary of the mine, including production figures. It contributes nothing original to the geology, and apparently accepted the opinions of the mine staff and their predecessors without question. It recommends no further exploration east of the Robinson, and no surface geological mapping. Recommendations are confined to underground drilling in the vicinity of the known orebodies.

File No. 14: Irvine, W. T., 1943, Geology and Development of No. 8 Orebody, Britannia.

Mainly concerned with underground work, but also provides a useful summary of the advances in geological thinking during the 1930's, for example the realization that "green mottled schist" is derived from fragmental volcanic rocks and not from the "Mine Porphyry". Mapping however was still based largely on alteration types rather than original rock units, and no attempt was made to unravel the structure in detail.

File No. 17: 1947, Geological Discussion Club

Visiting geologists, in discussions with company staff, stressed the need for detailed geological mapping within the mine in order to work out the structural controls of the ore. Recommendations for surface mapping (100 square miles?) in order to understand the structural setting of the mine and to find possible extensions. Opinions were offered to the effect that the shear zone deserves further prospecting by long diamond drill holes, especially to the west of No. 8 and below the 4100 level.

B. Western Area - Jane Mine to Britannia Beach

File No. 12: Lundberg, H., 1941, Geophysical Survey of a Portion of the Property of B. M. & S. Co.

Geophysical surveys by both resistivity and electromagnetic methods were made across the shear zone from the 4100 portal to the Heather Fraction M.C. (28,000 E). The belts of weak anomalies which were traced correspond with known outcrops of mineralized schist and old surface prospects, so that nothing new was discovered. Mineralization occurs on the Sound Fraction, Hunter's Friend, Daisy, Armour, and Mineral Creek M. C.'s, and a second belt further to the footwall is picked up on the extreme east end of the survey. The survey did produce a geological map locating most of the major rock outcrops in the western part of the shear zone. Such a map necessarily overemphasizes the massive unsheared rocks which dominate in outcrop. Among seven diamond drill holes recommended, four were drilled, to depths of less than 200 ft., and were too short to add much to the surface information previously available.

Geophysical experiments conducted on the 4100 level near the No. 8 orebody, while the mine power was shut off, indicated that the resistivity method is not diagnostic, but that the self-potential method may pick up an anomaly where ore lies within 500 ft. of the drift. (?)

File No. 18: Killin, A. F., 1952, Progress Report on Western Area of Britannia.

Concludes, from surface reconnaissance, that a belt of rocks favorable for mineralization ("sheared tuffs") extends from near the Daisy workings to near the 4100 portal. Re-examination of the Daisy workings showed a lens of zinc mineralization in anhydrite to the NE of Cut No. 1, Daisy M.C. East of the Daisy, there are two parallel bands of schist on

the Mineral Creek and William M. C.'s. The report recommends that surface geology be mapped on the north spur of Britannia ridge in an attempt to relate the Jane structure to the schists on the William M. C.

File No. 27: Ford, S., 1954, Hangingwall Area Prospecting Report.

Notes and extensive area of northeast dips in the 83, 84 and 85 M. C.'s west of the Victoria. A number of minor mineral occurrences are reported southwest of the mine area, most of them chalcopyrite developed sporadically near granite contacts.

Mention is made of sulphides in quartz veins in Zinc Creek, a north tributary to Mineral Creek just above the Daisy campsite.

File No. 28: Nelson, W. I., 1954, Report on the Hangingwall Area.

This was an attempt to correlate surface geology with some long holes from the 2200 level, and to trace a mineralized zone westward from the Winston Fraction M. C. Neither aim was adequately achieved because of poor exposures. Reference is made to the Bendigo-Sumatra "siliceous zone, which is weak and spotty, with sporadic lead-zinc mineralization on the north boundary of the Bendigo and Moccasin Fraction M. C.'s, adjacent to the subsidence area.

File No. 29: Nelson, W. I., 1954, Exploration in Hangingwall Area

Describes the surface examination of an area north of Furry Creek, including the Evening Star and the 84 and 85 Fraction M. C.'s. North-east dips are again noted, in tuffs and argillites.

Summary of Western Area

The best surface showings are at the Daisy prospect, where Kobler's 1954 map shows 2.3% Cu over 12 ft. in Cut No. 2, and approximately 1.0% Cu over 36 ft. in Cut No. 1 (27860 N, 23680 E). Other smaller showings within

the shear zone have been prospected between here and the 4100 portal, though the extent of the alteration diminishes toward the west. The summit of Britannia ridge, a triangular area roughly outlined by the Summit, Heather Fraction and Bendigo M. C.'s, might provide enough rock exposures to permit a structural interpretation south and west of the Jane Basin.

C. Eastern Area - Victoria to Seymour Creek

File No. 2: Schofield, S. J., 1922, Britannia Mines and the Woodland Group.

A general discussion of the mines is followed by a report on the Woodland Group of claims which lie on the south side of Clipper Creek. The shear zone is seen in the lower half (northern half?) of the Ash M. C. and the northwest corner of the Fir M. C. The hangingwall limit of the shear zone is exposed on the south wall of Clipper Creek valley, but the footwall portion is concealed by the valley alluvium. Open cuts and one tunnel on the northwest part of the Ash M. C. showed non-commercial mineralization (less than 1% Cu) similar to that found on the Furry-Clipper Divide. Schofield considers that most of the shear zone from Victoria to Fairwest is covered by alluvium, especially the "favorable" footwall portion. From the Fairwest to the Bee M. C. (Furry-Clipper divide) little is known about the shear zone, though diamond drill holes 6-15-1 and 6-15-2 on the northwest part of the Peacock M. C. found weak pyritization and schistose rocks. From the divide the hangingwall of the shear zone can be traced on the south wall of the valley as far as the Ypres Fraction M. C. Maps of this section support the hypothesis that rock structure transects the line of the shear zone at about 35 degrees here.

File No. 4: James, 1923, The Sun Group of Claims

Four claims of the Sun Group are located on the west bank of Seymour Creek about 6 miles (?) south of Clipper Creek. Spotty and low-grade mineral-

ization (less than 0.5% Cu) is associated with granitic and high-grade metamorphic rocks. No development recommended.

File No. 6: Schofield, S. J., 1926, The Shear Zone East of Victoria

Dismisses the possibility of finding ore east of the Victoria for various theoretical reasons, none of which is very convincing.

File No. 8: Husberg, E., 1926, Electrical Prospecting of the Fairwest.

Electrical surveys (equipotential method) from the Fairwest eastward to the Ash M. C., showed weak anomalies over the known showings, and a weak anomaly over the northeast part of the Reggie M. C. beneath overburden. No quantitative data on the anomalies are provided.

File No. 11: Rogers, Mayer & Ball, 1940 (see Section A)

Early work on the Fairwest prospect is reviewed in pages 46-47 of this report. Ore was not found in minable widths, and no further development was recommended.

File No. 19: Thurber, J. B., 1952, Britannia and Surrounding Area.

Red Mountain No. 2 M. C., north of Loch Lomond, contains a vein of high-grade chalcopyrite according to a B. C. Dept. of Mines Report, 1913. No subsequent work is cited.

File No. 20: Thurber, J. B., 1952, Report on Eastern Area of Britannia
Theories without factual support.

File No. 23: Markland, G. D., 1953, Progress Report on Eastern Area.

A field party worked along the shear zone, out of Fairwest Camp, with the object of gathering field data relevant to the theories suggested by J. B. Thurber. If detailed geological information was obtained, very little of it appears in this report. The author concludes (as did Schofield in 1922)

that the shear zone follows Furry and Clipper Creeks, but that trends of rock units and of the shearing itself turn increasingly northwards at the east end. The top of the ridge south of the Furry-Clipper valley shows little or no shearing or rock alteration. Some of the tributary creeks flowing south between Victoria and Fairwest expose north-dipping schists.

Minor showings on the Crackerjack, Winston Fraction, and Hunter's Best M. C.'s are dismissed as of no commercial interest. The showings along the shear zone from the Furry-Clipper divide to the Ash M. C. are described as the best mineralization east of Victoria, but no geological map is appended and few details are given. At the west end, near the divide, a 20 ft. width yielded 0.5% Cu in 1922. Mineralization is strongest and widest on the Reggie M. C., where a 102-foot adit was reported to carry 0.3% Cu (N.B., notes opposite p. 14 in File No. 19 indicate spotty values averaging much less than 0.3% for this adit). Similar but narrower showings occur on the Ash M. C.

On the Cycad M. C., on Cyrtina Creek at elevation 2700 ft., green schist contains disseminated pyrite with a few stringers of chalcopyrite. On the Bee M. C. L-2129, weakly sheared andesite contains stringers of pyrite and traces of sphalerite at elevation 2700. The Bank of Vancouver claims, also discussed here, are more fully dealt with in File No. 24.

File No. 24: Markland, G. D., 1954, Progress Report on Bank of Vancouver Group.

These claims lie to the east of the shear zone, and are associated with granitic and dioritic rocks of the batholith. Irregular fracture fillings of pyrite, pyrrhotite and chalcopyrite were investigated rather thoroughly by trenching and diamond drilling. 200,000 tons of 1.08% Cu were outlined, but there appeared little chance of developing a mine.

File No. 26: Ford, S., 1953, Prospecting the East Britannia Rocks.

The purpose of this report is to emphasize the physical difficulties of surface work around Britannia, and the need for well equipped and energetic field parties if results of any value are to be obtained. It is claimed that detailed studies were made by the 1953 field parties, but results do not seem to have been recorded.

Summary of Eastern Area

From Victoria to the Fairwest, exposures along the shear zone are too poor to permit an assessment of possibilities at the surface. An apparent offset of the shear zone at the Furry-Clipper divide, coupled with the availability of good exposures on the ridge to the south, suggests a need for geological mapping here. The most promising indications of mineralization are found between the Furry-Clipper divide and the Ash M. C., and it appears that nothing new has been learned about this area since 1925.

D. Indian River and Goat (Raffuse) Creek

File No. 3: Schofield, S. J., 1923, Report on Mining Claims of Indian River, B. C.

Several occurrences of mineralization associated with metamorphic rocks near their contacts with the granitic rocks. The Roy No. 1 M. C., east of Indian River, includes a small area of slightly sheared metavolcanics, with a 1/2 - 2 ft. thick vein of pyrite-chalcopyrite. The Caledonian Group, now the easternmost of the Company's claims, exhibit some "green mottled schist and silver schist" with traces of pyrite. These and related occurrences are all considered uneconomic.

File No. 7 (1925), 9 (1927), and 10 (1928)

These reports all deal with the McVicar group of claims, on the west side of Goat (Raffuse) Creek, and accessible via the Mamquam Valley from

Squamish. Chalcopyrite mineralization is widespread in schistose rocks similar to those of the Britannia mine zone. (These claims are not discussed further here because the Company has relinquished interest in them.)

File No. 25: Kobler, H. G., 1954, Examination Report on Noyon-Thames Group.

These claims lie to the west of Indian River, within the Howe Sound property. They show slight pyrite mineralization in granitic and basaltic (?) rocks. No economic interest.

File No. 30: Kobler, H. G., 1955, Appraisal of the Belle Group.

(preliminary, covered more fully by File No. 32)

File No. 32: Cohen, H. H., 1954, Report on the Belle Group.

These claims are near the head of Indian River, and can best be reached via logging roads from Upper Stawamus Creek on the north side. 10 claims were relocated by B. M. & S. Co. in 1954. Showings consist of sparse chalcopyrite and pyrite in a siliceous intrusive rock. Apparently no commercial interest.

E. Region Surrounding Britannia

File No. 19: Thurber, J. B., 1952, Britannia and Surrounding Area.

A brief mention of several prospects reported within a 15-mile radius of Britannia.

a) Britannia West Copper Co., claims on the west side of Howe Sound north of Britannia Beach. Granite porphyry locally sheared and mineralized with pyrrhotite and chalcopyrite (later pencilled note says "examined and found too low grade").

b) Howe Sound Copper Co., located "2-1/2 miles from the beach at the head of Salmon Arm", west of Britannia. Copper sulphide veins

mentioned by Leroy in his 1918 Geol. Survey of Canada Report. In 1929 the Pacific Copper Co. leased lots 353 and 354, but could not substantiate the previous findings.

c) Horseshoe Group, on McDonald Creek four miles southwest of Britannia Beach, staked for 7,500 ft. back from the beach towards Mt. Ellesmere. A belt of schists and argillites strikes E-W. Sulphide mineralization at about 1400 feet elevation and 500 feet north of creek.

d) Crofton Group, 3/4 mile up McNab Creek, 10 miles southwest of Britannia. A little pyrite, galena and sphalerite along the contact of granodiorite and sheared volcanics.

Several other prospects receive brief mention.

CATALOG OF GEOLOGICAL REPORTS - BRITANNIA REGION

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September, 1961

<u>File No.</u>	<u>Date</u>	<u>Name of Report</u>	<u>Author</u>	<u>Map Scale</u>	<u>No. of Copies</u>
1	1908	Extract from: Prelim.Rept. on portion of main coast of B.C. & adjacent islands. Geol. ^{Geol.} Surv.Can.	LeRoy, O.E.		1
2	1922	Progress Rept. on examination of Britannia Mine. *(Includes Woodland group of claims on W.Fork of Seymour Ck.)	Schofield, S.J.		1
3	1923	Report on mining claims of Indian River, B.C.	Schofield, S.J.		
4	1923	The Sun group of claims (Seymour Creek)	James		1
5	1925	The Jane, Robinson & Fairwest Mines	Schofield, S.J.		1
6	1926	The Shear Zone east of Victoria Mine	Schofield, S.J.		1
7	1925	McVicar & Brown Property, Goat R.	Schofield, S.J.	1"=1000 ft.	1
8	1926	Electrical Prospecting of Fairwest Property	Husberg, E.	1"=200 ft.	1
9	1927	McVicar Property on Goat Creek		1"=800 ft.	1
10	1928	McVicar Property, Goat Creek	Schofield, S.J.	1"=100 ft.	1
11	1940	Rept. on Mines of B.M.&S.Co. Britannia Beach, B. C.	Rogers, Mayer & Ball		2
12	1941	Final Rept.on Geophysical Survey of portion of property of B.M.&S.Co. (West End)	Lundberg, H.	1"=200 ft.	2
13	1943	Reconn.Rept.on northern B.C. & Yukon.	ApRoberts		1
14	1943	Geology & Development of No. 8 Orebody, Britannia	Irving, W.T.		3
15	1944	Exploration Possibilities to W of Victoria Orebody below 4100 level (Underground Only)	Irvine, W.T.		1
16	1946	McVicar assays & brief report (Goat Creek)	Mentzel, C.		1
17	1947	Geological Discussion Club - recommendations.			
18	1952	Progress Rept.Western Area of Britannia	Killin, A.F.		2

<u>File No.</u>	<u>Date</u>	<u>Name of Report</u>	<u>Author</u>	<u>Map Scale</u>	<u>No. of Copies</u>
19	1952	Britannia Area (general historical survey)	Thurber, J.B.		1
20	1952	Report on Eastern Area of Britannia	Thurber, J.B.	1"=400 ft.	2
21	1952	Empress Mine Investigation (Underground Only)	Kutz, K.J.	1"=100 ft.	2
22A	1953	Utilization of Dithizone Method	Thurber, J.B.		1
22B	1953	Structural Devpt. of Orebodies at Britannia	Thurber, J.B.		1
22C	1953	Struct., Stratig. & Igneous Factors of Mineral Deposits in Britannia - Indian- Mamquam Area	Thurber, J.B.		2
23	1953	Progress Rept. on Eastern Area of Britannia (Esp. Bank of Vancouver)	Markland, G.D.	1"=600 ft.	1
24	1954	Progress Report on Bank of Vancouver Area	Markland, G.D.	1"=40 ft.	1
25	1954	Exam.Rept.on Noyon-Thames (Indian River)	Kobler, H.G.	1"=1000 ft.	2
26	1953	Prospecting the East Britannia Rocks	Ford, S.		1
27	1954	Hangingwall Area Prospecting Report (S & SW of Mine)	Ford, S.		1
28	1954	Rept. on Hangingwall Area (esp. Bendigo)	Nelson, W.I.		2
29	1954	Explor. in Hangingwall Area (N. of Furry Creek)	Nelson, W.I.	1"=200 ft.	1
30	1955	Appraisal of Bell Group (Indian River)	Kobler, H.G.		1
31	1954	Explor. Possibilities to W of Victoria, below 4100 level	Irvine, W.I.		1
32	1954	Report on Belle Group, Indian River, B. C.	Cohen, H.H.	1"=80 ft.	1
33	1956	Empress Mine - notes	Smith, A.		1

Publications: Schofield, S.J. "The Britannia Mines, B.C." Economic Geology, vol. XXI, 271-284, May 1926.
 James, H.T., Britannia Beach Map Area, B.C. Geol. Surv. Canada. Memoir 158, 1929
 Ebbut, F., Relationship of Structure to Ore Deposition at the Britannia Mines, Can. Inst. Min. Met. p. 123-133, 1935.
 Irvine, W.T. Britannia Mine - Struct.Geol. of Canada & Ore Deposits. Can.Inst.Min. Met. Volume, 105-109, 1948.