

ORIGINAL

GEOLOGICAL REPORT

ON THE

SURF INLET AND PUGSLEY MINES

53° 05', 128° 53', 103H/2W

825986

BY

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FOR

Owner: Matachewan Consolidated Mines Limited
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SUMMARY

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1. The Surf Inlet Area is on Princess Royal Island, approximately 160 km southeast of Prince Rupert and has been a major source of gold, silver and copper in the past. The main period of operation was between 1917 and 1926.
2. The Surf and Pugsley mines produced to the end of 1942 a total of 1,091,131 tons from which were recovered 382,351 ounces of gold, 208,752 ounces of silver and 6,314,341 pounds of copper. The average head grade was 0.425 ounces per ton gold. Mill recoveries averaged between 88% and 92%.
3. The ore was mined from underground workings. Access below 900 level is from internal inclined shafts. The entire operation was electrified from a nearby lowhead hydroelectric plant.
4. Gold mineralization is localized along an extensive, complex shear system that cuts gneiss and diorite. Gold associated with pyrite occurs in quartz-ankerite-sericite-sulfide veins.
5. Ore shoots are up to 12 meters wide and range from 30m to 300 meters long. Distribution of ore within the veins depend on late stage fault adjustments and flexures during which veins along certain shear surfaces were fractured and mineralized.
6. Ore reserves calculated by mine staff when the mine closed in 1942 due to labour shortages and general wartime conditions were 47,000 tons at historic grades (0.4 oz/ton Au). Mine Dumps outside of 550 portal have been estimated to contain in excess of 400,000 tons averaging a cut grade of 0.059 oz/ton Au.
7. There is excellent potential to find more ore down-dip from the Pugsley and Surf ore zones. Other areas of high exploration potential are between the two ore zones and south of the Pugsley workings.
8. A Stage I program of biological preoxidation leach testing on dump material, data compilation and portable, modular mill design feasibility is recommended at an estimated cost of \$86,250.
9. Contingent on the results of Stage I, A Stage II program of surface diamond drilling on the Pugsley Zone and limited rehabilitation of 900 level Pugsley Mine to examine the south exploration drift is recommended at an estimated cost of \$564,650.
10. If results of Stage I and II are favourable, then dewatering of the Pugsley Mine and underground exploration will be warranted.

INTRODUCTION

The Surf Inlet-Pugsley Mines are the seventh largest source of gold in British Columbia, having produced a total of 1,091,131 tons of ore with overall recoveries of 0.350 ounces gold, 0.18 ounces silver and 0.29 % copper per ton. Mill recoveries were approximately 88%-92%. Only Bralorne-Pioneer, Rossland, Premier, Nickle Plate-Mascot, Island Mountain - Cariboo Gold Quartz and Phoenix have produced more gold.

Very little published geological information is available on the Surf Inlet area or the ore bodies which were mainly mined in the period 1917-1926. However, a detailed collection of private reports, plans and sections documenting the geological and extraction processes have been saved by the present owners; Matachewan Consolidated Mines Ltd.

Gold mineralization is localized along an extensive, complicated shear system that has developed in intrusive and gneissic volcanics and metasediments of the Coast Plutonic Complex. Gold associated with pyrite occurs in quartz-ankerite-sericite-sulfide veins. Distribution of ore shoots within the veins depend on late stage fault adjustments and flexures during which veins along certain shear surfaces and zones were fractured and mineralized.

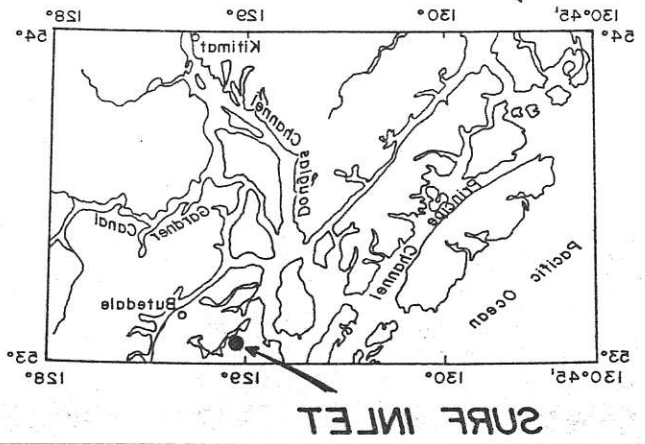
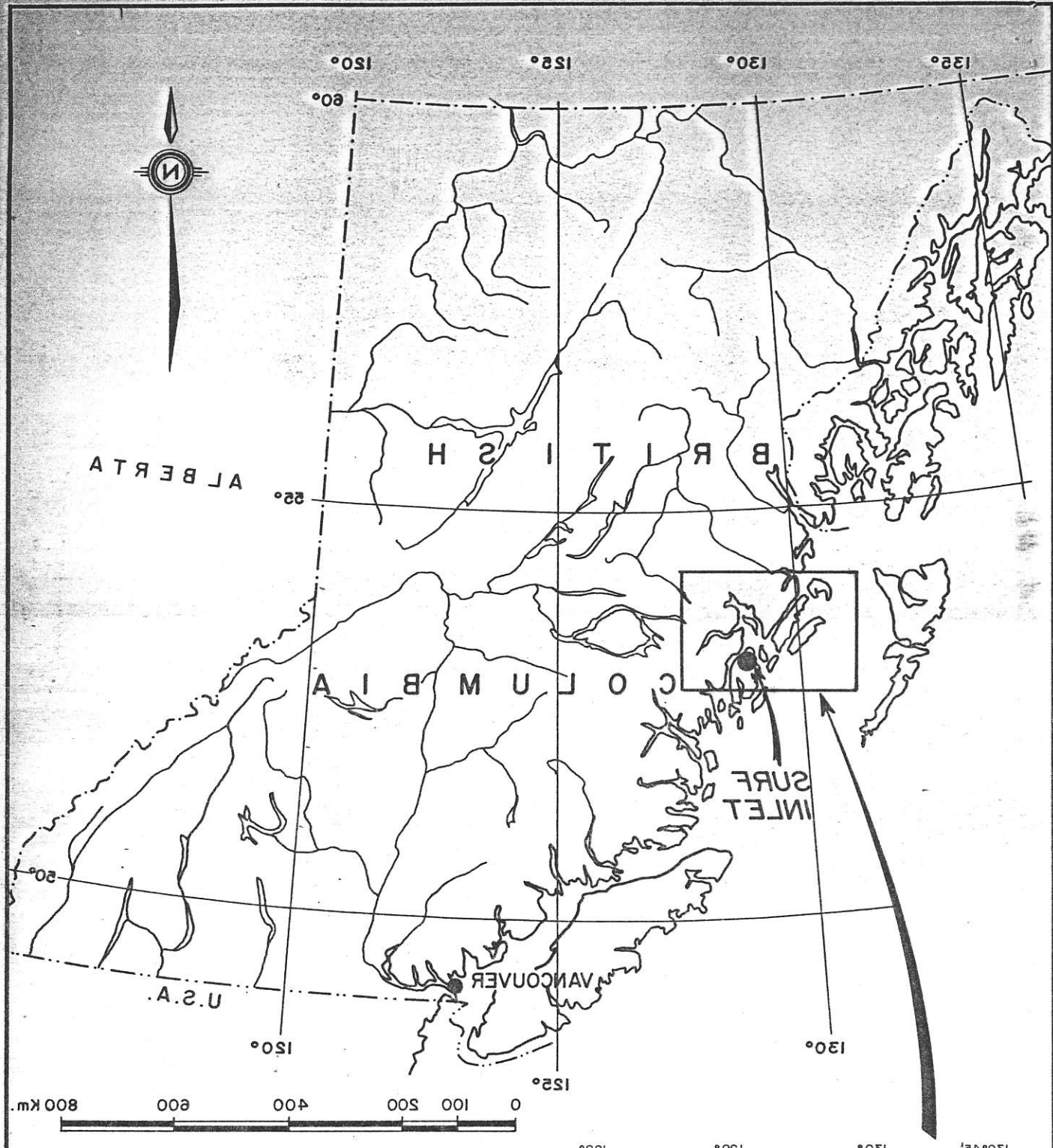
Current interest is focussed on applying modern metallurgical leaching processes for enhancing gold recovery from dump material, exploration of down-dip extensions of the Pugsley and Surf ore bodies and the possibility of new ore zones south of the Pugsley workings as suggested by surface mineralization.

Approximately 400,000 tons of dump material is situated outside the Surf 550 level portal that sampling indicates a cut value averaging slightly in excess of 0.05 oz/ton Au.

Ore reserves calculated at the close of the mine in 1942 due to labour shortages and general wartime conditions are 47,000 tons at historic grades (0.4 oz/ton Au).

This report summarizes geological considerations, necessary to evaluate the exploration potential of the property and recommends a three stage work program.

invert



LOCATION MAP

PROJECT : SURF INLET

ENG. : TRM ENGINEERING LTD.

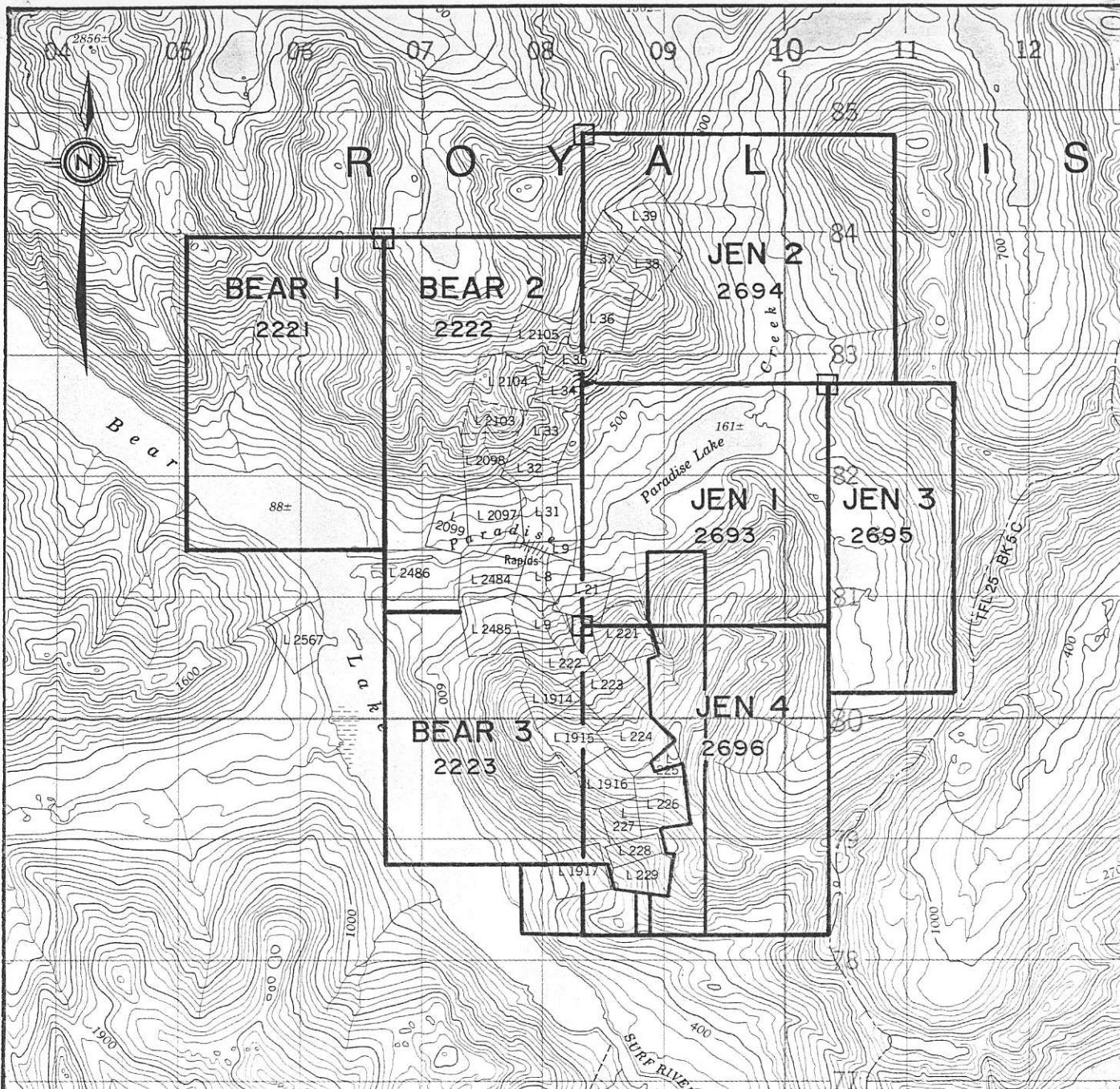
DWG. NUMBER : FIGURE 1

LOCATION AND ACCESS

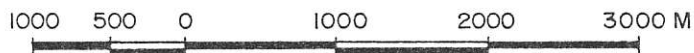
The Surf and Pugsley Mines are located near the head of Surf Inlet on Princess Royal Island approximately 160 kilometers southeast of the main supply base at Prince Rupert, Figure 1. The property is at 53° 05'N latitude and 128° 53'W longitude in mapsheet NTS 103 H/2W about 105 km southwest of Kitimat and 115 km northwest of Bella Bella. The nearest sizeable community is Hartley Bay, 44 km northeast. The docking facility at Butedale on the east coast of Princess Royal Island is a port of call for ships travelling the "Inside Passage" between Vancouver and Prince Rupert. Butedale is 16 km east of the Surf Inlet minesite. Ocean-going ships were able to call on the wharf at the head of Surf Inlet when the mines were in production. Currently the most active center of mineral exploration near Surf Inlet is Trader Resource Corp's gold project on Banks Island, 90 km to the northwest.

The Surf and Pugsley orebodies, located on the north and south sides of Paradise Creek, are 11 km from the wharf and hydro-electric power site at the outlet of Cougar Lake. In the past, electric tramways and barges formed the supply link from the mines to tidewater. A tug and barge carrying fifteen 1-ton mine cars operated on the lake. At the mouth of Paradise Creek an overhead-trolley electric railroad ran to the camp on an even grade. An incline from the ocean dock to the lake, a distance of 314 feet, and equipped with an electric hoist completed the transportation. Fixed wing aircraft with floats can land on Paradise Lake and a short foot-trail connects Paradise Lake to the minesites.

Topography in the area is very rugged with steep sided peaks rising to a maximum elevation of 1100 m ASL. The lowest level in the Pugsley Mine is the 1500 Level which is 500 feet (152 m) below sea-level. The lowest level on the Surf Mine is the 1400 and is 275 feet (84m) below sea-level.



SCALE 1 : 50,000



CLAIM MAP

PROJECT : SURF INLET

ENG.: TRM ENGINEERING LTD.

FIGURE 2


 Legal Corner Post and Claim Line

CLAIM STATUS

The property consists of the following claims as illustrated on Figure 2, as listed by Freeze and Juras (1981):

TABLE 1

LIST OF CLAIMS

Crown Grants

Owner: Matachewan Consolidated Mines Ltd.

21 Crown Grants

Bee	Lot 1915	Lake Fr.	Lot 32
Bench	35	Lakeview	229
Bluebell	2485	Marcia	2484
Bluff	34	Mountain Fr.	37
Cassie	228	Olive	227
DLS	31	Princess Royal	7
Excelsior	9	Sadie	8
Granite	1916	Sea Fr.	1914
Gulch	33	Twin Peaks	38
Independence Fr.	222	UTA Fr.	36
La Quivree	39		

Annual Mineral Land Taxes (1983) \$518.21

Owner: Cominco Ltd.

<u>Claims</u>	<u>Units</u>	<u>Rec. Nos.</u>	<u>Expiry Date</u>
Bear 1	15	2221	April 16, 1987
Bear 2	15	2222	April 16, 1987
Bear <u>3</u>	<u>20</u>	2223	April 16, 1987
3	50		

TABLE 1 (continued)

LIST OF CLAIMS

Placer Development Ltd.

<u>Claims</u>	<u>Units</u>	<u>Record Nos.</u>	<u>Expiry Date</u>
Summit	1	1980	January 14, 1987
Bonanza	1	1981	" 1987
Anaconda	1	1982	" 1987
Turner Fr.	1	1983	" 1987
Homestake	1	1984	" 1987
Sea Gull	1	1985	" 1987
Brown Bear	1	1987	" 1987
Little Tomy Fr.	1	1986	" 1987
Sunlight Fr.	1	1988	" 1987
Sea Lion Fr.	1	1989	" 1987
Sheet Anchor Fr.	1	1979	" 1987
Jen 1	20	2693	November 27, 1986
Jen 2	20	2694	" 1986
Jen 3	10	2695	" 1986
<u>Jen 4</u>	<u>20</u>	2696	" 1986
15	81		

Miscellaneous Assets

Certificate of Title (Matachewan)

- No. 80162-1 Lot 7 (except 1.43 Ac.) and district lot 40, 2486, 2487 and 2488, all Range 4, Coast District.
- No. 9244-1 Lot 11, Range 4, Coast District, registered in name of Surf Inlet Power Co. Ltd.
- No. 14746-1 Lot 1366, Range 4, Coast District, registered in name of Surf Inlet Power Co. Ltd.
- No. 12251-1 1.43 Ac. of Lot 7, Range 4, Coast District, registered in name of Surf Inlet Power Co. Ltd.

Water rights for Cougar Lake power and lease of site for wharves and powerhouse (Matachewan), water rental (1983) \$1,106.50.

Timber rights are associated with some of the crowngrants. Tree Farm Licence 25 (Block 5C) owned by Western Forest Products is situated immediately south of the mineral claims. Minor recent logging has taken place around Whalen Lake and at the head of Drake Inlet on northern Princess Royal Island.

HISTORY

The original discovery of gold in the Surf Inlet Area was made in the late 1800's by tracing white quartz float from the bottom of the valley which enters Bear Lake from the east, up to where the vein outcrop on the north and south sides of the valley. The first claims were located in 1898 and are the oldest in the Skeena Mining Division exclusive of the Queen Charlotte Islands (McConnell 1914).

Trial shipments of the ore were first made in 1902, and although these yielded excellent values in gold (about 5 oz per ton) and copper (about 3 %), subsequent work was discouraging (Roddick 1970). There is no record of the tonnage or value produced in this period and some doubt arose as to the average grade of the ore. Activity on the property remained at a low level until 1912 when a more vigorous development program began. The property was initially known as the "D.L.S. Group" and was owned by Surf Inlet Mines Limited who optioned them to the Belmont Canadian Mines Ltd. in March 1914. The Belmont Canadian Mines Ltd., a subsidiary of Tonopah-Belmont Development Company, developed and bought the property by reorganizing into the Belmont-Surf Inlet Mines Ltd. The property produced continuously from September 1, 1917 to June 30, 1926. Records show that 848,883 ore were produced from which 322,297 oz. of gold, 176,734 oz. of silver and 5,244,772 pounds of copper were recovered (Dolmage 1946).

The 1918 Minister of Mines Annual Report indicates a mill recovery of 92%. Dolmage (1946) reports for the period 1916-1926:

During that period, 848,883 tons of ore were mined, of which 57,632 came from the Pugsley. The average grade of this ore was 0.425 ounces of gold, 0.30 ounces of silver and 6 pounds of copper per ton. The maximum daily production was 400 tons and the average operating costs were \$5.20 per ton (1) To the end of 1925, detail records show that from 822,233 tons of ore mined, 307,452.9 ounces of gold; 169,348 ounces of silver and 5,083,530 pounds of copper were recovered.

(1) the above figures are taken from reports by Charles Mentzel

These figures quoted by Dolmage indicate approximate gold recoveries of 88% assuming an average head grade of 0.425 oz/ton. The operators felt that there was no remaining ore when the mine closed in 1926.

In 1934, after the price of gold was raised, a new company was formed, Princess Royal Gold Mines by J.B. Woodworth, to acquire, rehabilitate and operate the property. This attempt failed and in 1935 the mine was again closed. The company was refinanced in 1936 and its' name changed to Surf Inlet Consolidated Gold Mines Ltd. The old mill was originally rated at 300 tons per day, but much of the machinery was removed prior to 1934 or had become obsolete. Milling resumed at 50 tons per day in 1936 and was gradually stepped up to a little over 100 tons per day by 1940 (Honsberger 1973).

Overall, to the end of 1942, when the mine was closed by a scarcity of labour and general war conditions, total recorded production from the property amounted to 1,091,131 tons of which 169,886 tons came from the Pugsley and the remaining 921,245 tons from the Surf orebody. From this ore were recovered 382,351 ounces of gold, 208,752 ounces of silver and 6,314,341 pounds of copper (Dolmage 1946).

When the mine was in operation, power was obtained from an efficient low head hydro-electric plant constructed in 1916 using a reinforced concrete dam of the Ambursen patent type. The dam is high enough to raise the level of the lower lake to make a continuous waterway from the head of the dam to the foot of the mountain, about 1.6 km from the mine.

Subsequent exploration is summarized by Honsberger on Page 6 as follows:

"In mid 1946, the Pugsley Mine was unwatered and drifting and raising was done and extensive diamond drilling was carried out. Considerable development was done on the 10th, 11th, and 13th levels of the Pugsley Mine. In May 1947, a new horizontal drift was driven at 1,000-foot elevation to investigate large unexplored area to south of the workings. The Surf Mine has been inactive since 1942. It has adit at 550-foot level with winze to 1400 feet. The reports of progress of exploration and diamond drilling from 1942 to 1947 which are available to the writer are sketchy and incomplete."

The company was reorganized in 1954 and again 1959 with a name change to Western Surf Inlet Mines Ltd. in 1966 the company merged with Matachewan Consolidated Mines Ltd. on the basis of 5 new shares for 4 old shares.

Cominco Limited, Placer Development Limited and Matchewan Consolidated Mines Limited entered an agreement in 1981 to carry out exploration on the Surf property. The program conducted in 1981 consisted of geological mapping on surface and underground, sampling of surface showings limited geochemistry and ten shallow diamond drill holes totalling 1526.4 meters (5008 feet). The Cominco-Placer work was directed toward outlining a large tonnage open-pit deposit. The Cominco-Placer option was terminated on December 31, 1984, and the property returned to Matachewan Consolidated Mines Limited.

REGIONAL GEOLOGY

Regional geological features of Princess Royal Island have been compiled by Roddick (1970) on Map 23-1970 and Baer (1973) on Map 1328A, Figure 3, mainly from fieldwork conducted by the Geological Survey of Canada in 1963 along coastal exposures and in 1965 using wide spaced landings with a helicopter on interior sites. This work expanded on the pioneering efforts of V. Dolmage (1922) who mapped shoreline exposures in 1920 and 1921.

Princess Royal Island is underlain by granitic plutons and subordinate metasedimentary rocks that occur at the western margin of the Coast Plutonic Complex. The granitic plutons intrude isoclinally folded, metamorphosed, calcareous and pelitic sediments of probably Paleozoic Age. The island has a central core of mainly dark hornblende biotite quartz diorite (unit 8) Figure 3, containing fairly common bands of dark dioritic gneiss. Roddick (1970) notes:

"In places, particularly near Cougar, Bear and Deer Lakes sphene and epidote are common and biotite forms large crystals although hornblende is more abundant. Inclusions form elongate 'schools', thin ribbons and screens. This rock may be related to the Captain Cove Pluton judging from the epidote and sphene content, but it is generally darker and has a higher specific gravity (2.78)."

The eastern part of Princess Royal Island, and around the mouth of Surf Inlet is underlain by medium to coarse grained, hornblende biotite granodiorite. On Whalen Lake the granodiorite appears to grade westward into quartz diorite which differs megascopically only in being somewhat darker, better foliated and containing fairly numerous drawn out inclusions and thin layers of fine-grained diorite and amphibolite. On the western shore of the Island a peripheral gneissic diorite-gabbro-migmatite phase is found.

The major structures in the area are dominated by the apparently near-vertical Grenville Channel Fault which can be traced over 200 km from Porcher Island in the northwest to Sarah Island in the southeast. An important splay of the Grenville Channel Fault passes through the Bear Lake-Surf Mine area. Little is known about the direction of movement along the Grenville Channel Fault, (Roddick 1970 page 43), because the rocks bordering the fault have recrystallized since most of the movement took place. Right-hand offset is suggested by indirect evidence.

LOCAL GEOLOGY

The most detailed accounts of the local geology are contained in Gill (1941) and Freeze and Juras (1981). The following discussion of local geological conditions is taken mainly from Freeze and Juras (1981) for surface mapping and Gill (1941) for subsurface geology.

In 1981, all accessible ground was mapped at 1:5,000 scale, the results of which are compiled on Figure 4 (in pocket). Seven general lithologic units were recognized as follows:

(1) Gneiss Unit:

Coarse grained, moderate to well banded quartz-biotite-feldspar gneiss and plagioclase-hornblende-biotite gneiss. Complex folding is common and increases southward towards the Pugsley ridge summit. Banding most often conforms roughly to the dip of the shear system. Within the gneiss unit, tactite (skarn) lenses were cut in holes 81-4, 7 and 10.

(2) Diorite - Gneiss Contact Zone:

Characterized by an assimilation zone 5 to 100 meters wide consisting of numerous variably oriented gneiss fragments in diorite and irregular diorite dykes. This unit also encompasses those rocks of compositional or textural variance that can be classified as dioritic gneiss or gneissic diorite.

(3) Diorite:

The major unit on the property is diorite with minor associated quartz diorite. It is medium to coarse grained and in places displays a porphyroblastic texture with coarser grained, sub angular feldspar crystals. Adjacent to and within the shear zone the diorite becomes strongly foliated.

(4) Alteration Zone Associated with Shear System:

Toward the center of the alteration envelope; silica, sericite and ankerite increase at the expense of chlorite, calcite and epidote. Host units display varying degrees of fracturing, alignment and mylonitization. Rocks grade from subtle mylonites to intensely altered rock, in which all primary textures are obscured. Massive quartz veining with subordinate ankerite and sericite reflect the ultimate alteration development.

(5) Quartz Veins and Mineralization:

Throughout the shear system there are numerous quartz-sericite veins with variable ankerite and sulfide content. Four stages of mineralization are recognized consisting mainly of pyrite and chalcopyrite. Mineralization occurs in greatest abundance along the vein margins, particularly the footwall side.

(6) Pegmatite:

Very coarse grained dykes containing potassium feldspar, quartz and biotite which have intruded the diorite and parts of the shear zone. They are 5 centimeters to 1 m wide. Many dykes are simply zoned having a quartz core and quartz plus feldspar margins. No associated wall rock alteration was observed.

(7) Diabase:

The youngest rocks on the property. These dykes are 0.25 to 3.0 m wide, fine grained mafic porphyries consisting of 1-10% plagioclase, pyroxene and olivine phenocrysts.

ORE RESERVES AND MINERALIZATION

The ore deposits at Surf Inlet consist of many large quartz veins carrying gold in association with pyrite and chalcopyrite which occur along a persistent, complex north-trending fault system cutting hornblende gneiss-metasediments and diorite.

Gill (1941) describes the shear system as follows:

"The fault zone has been traced for 14,500 feet horizontally and 3300 feet vertically. It strikes N.20°E at the north end, N-S in the central section and N.20°W toward the south. In addition, there are local bends of as much as 30°. Similarly, down the dip there are local sharp bends, but the average dip is westward at between 50° and 60°.

"Several movements have occurred along the zone. The main displacement carried the west or hanging wall block obliquely upward and southward an undetermined distance, relative to the footwall. Later movements were small and more nearly horizontal. Most of these carried the hanging wall southward relatively. A few post-ore faults have been identified, but displacements are small and they cause very little difficulty in mining.

Within the fault zone, adjustments have been complex. In places there are two parallel or sub-parallel shear zones from a few inches to several feet across and 150 or 200 feet apart. More commonly, however, and particularly along the ore zones, there is a complex of linked shear surfaces or zones and tension cracks affecting a thickness up to 300 feet. In these places, while there is a shear surface bounding the complex on either side at any point, an individual shear surface may not stay in a bounding position, but may pass from one side of the zone to the other. Where this happens a split usually develops to continue the boundary with a more or less pronounced bend. Because of this, some confusion results from the mine terminology, where everything is referred to the "East Vein" or the "West Vein".

The 1981 surface diamond drilling demonstrated that the true width of the main footwall shear mineralized and altered rock varies between 4.6 meters (hole 81-5) and 44.4 meters (hole 81-8). The shear system cuts both gneiss and diorite with no apparent preference towards either unit.

In the Surf Mine, levels were established by the Belmont Company at approximately 100, 200, 320, 430, 550, 700, 800, 900, 1000, 1100, 1200, and 1400 feet vertically below an arbitrarily chosen datum at approximately 1110 feet above sea level. The Pugsley has levels at approximately 550, 700, 800, 900, 1000, 1100 and 1300 feet vertically below the same datum. In both mines, workings above the 900 level are accessible through adits (Gill 1941). Below the 900, entry is through internal inclined shafts, Figure 5, and presently full of water.

The individual ore zones are described in detail by Gill (1941) page 5 to 16. In summary both the Pugsley and Surf orebodies have a strike length of roughly 300 meters and extend vertically at least 425 meters. In past production areas, the maximum shear separation approaches 60 meters with economic vein width ranging between 0.6 meters and 12 meters. Vein lengths range from 30 meters to 300 meters.

The ore zones are marked by the presence of numerous veins of milky quartz that have been inserted along slippage surfaces and tension cracks. The quartz is composed of an aggregate of very fine anhedral crystals. The margins of the veins are almost invariably made up of a number of alternating bands of quartz and sericitized country rock lying parallel to one another and to the vein walls and ranging in width from a few meters down to several centimeters. Vein walls form a sharp contact with hosting gneiss or diorite.

Rocks in and near the ore zone contain sericite and carbonate from the alteration of feldspar and broader zones of chlorite from the alteration of hornblende and biotite. Within the quartz, pyrite forms up to 25% by volume. A multi-stage sulfide emplacement is envisaged, with the majority of gold deposited during the later stages of sulfide mineralization. In the paragenetic sequence, pyrite precedes, is contemporaneous with and postdates deposition of chalcopyrite and native silver. Other common sulfides and oxides include chalcocite, bornite, covellite, molybdenite, hematite and minor scheelite. A gold telluride, calaverite was noted during petrographic work by Cominco in 1981.

The main stages of sulfide emplacement are:

1. Deposition with quartz, sericite, chlorite on main north-south shear trends. Multi-stage emplacement (dominantly pyrite).
2. Deposition with quartz, sericite, chlorite on east-west trending shear systems (dominantly chalcopyrite).
3. Deposition along fractures with epidote, potash feldspar, magnetite (distal and likely later stage-mainly pyrite).
4. Deposition with late stage calcite and subordinate hematite (last stage, pyrite = chalcopyrite).

The distribution of ore shoots within the veins depended mainly on later fault adjustments during which only the veins along certain shear surfaces and zone were fractured and mineralized.

Both the Surf and Pugsley orebodies are in complex parts of the shear system. The Pugsley Mine can be divided into two parts above the 1100 level, referred to as the West Vein and the East Vein. The West Vein is a comparatively simple curved shear from a few inches to ten feet thick, with a dip between 45° and 60° west, Figure 6 and 7.

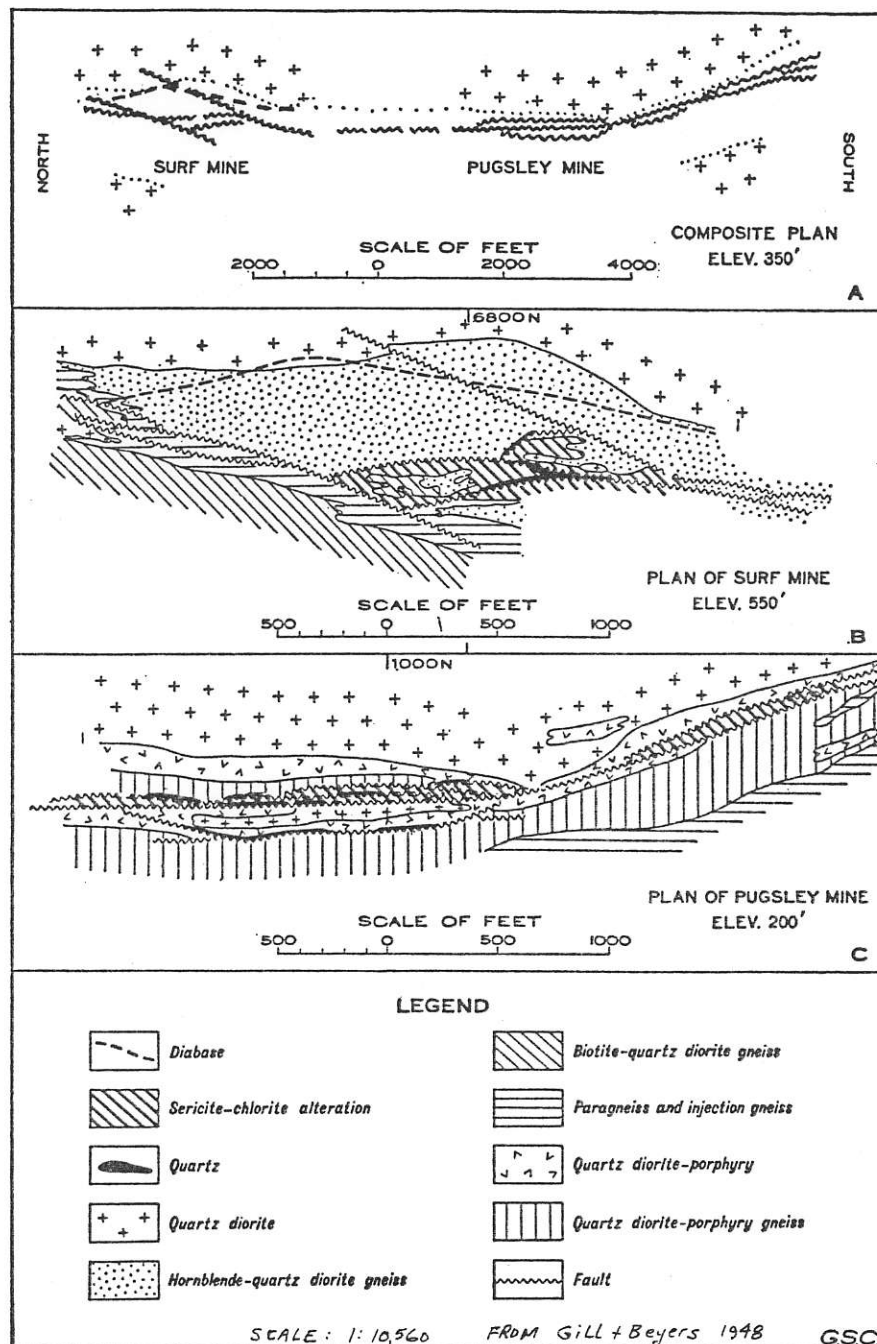


Figure 6 - Geological plans, Surf Inlet and Pugsley mines.

Above the 800 level and between 1150N and 1500N, subsidiary shears branch off into the footwall. The East Vein is a more complex shear net, in places as much as 100 feet thick (Gill 1941). The footwall of the East Vein is marked by a major shear, dipping at slightly lower angle than the West Vein. At the 700 level this footwall shear is 200 to 250 feet east of the West Vein, whereas at the 1100 level they are only about 110 feet apart. The Pugsley ore zone passes almost directly down the dip of the shear system as far as it has been traced.

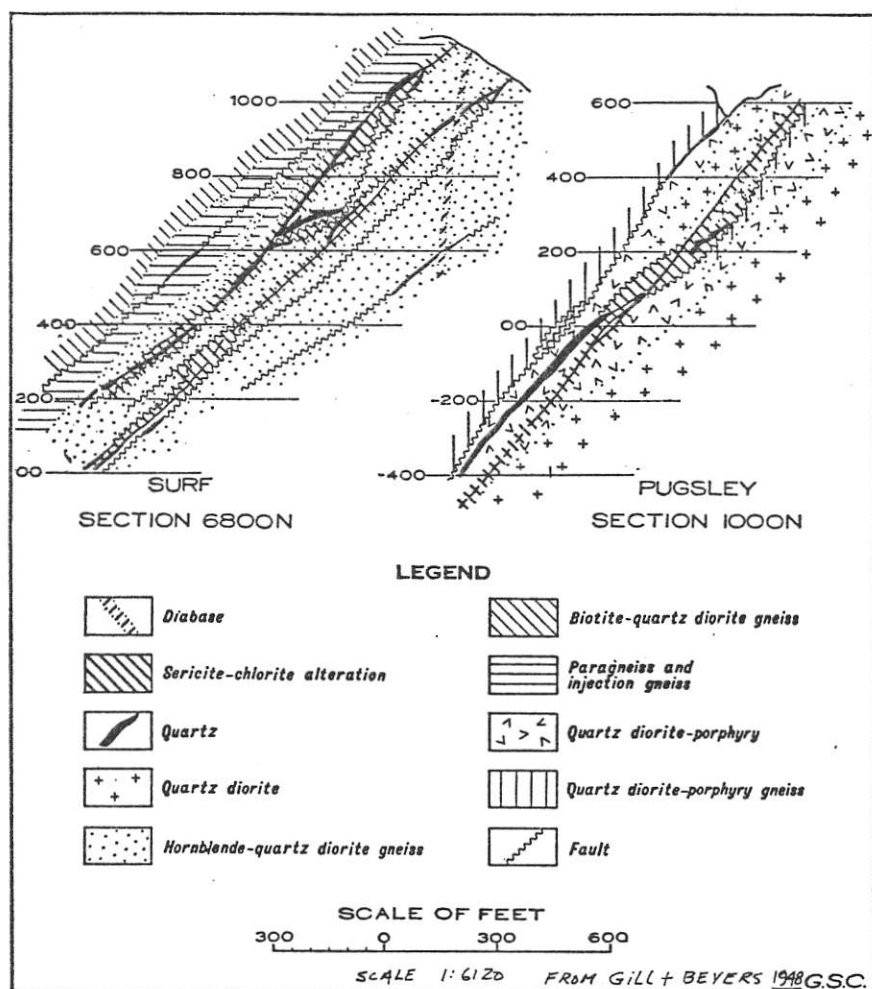


Figure 7 - Geological cross-section, Surf and Pugsley mines.

At the Surf Mine most of the ore was produced from shear structures trending north-south to 345° Az which link faults bounding the productive zone striking 010° to 020° Az. The southern limit of the ore, from 550 to 1000 levels is nearly down the dip. The mine staff considered that the Surf orebodies pitched southerly at about 35° , however, Gill (1941) shows that actually a northerly pitch is more likely overall.

After the mine shut down in 1942, the mine staff made an estimate of ore reserves January 1, 1943 as follows (from Honsberger 1973):

TABLE 2
ORE RESERVES 1943

	<u>Tons</u>	<u>Grade Ounces</u>
<u>PUGSLEY MINE:</u>		
<u>1000 Level</u>		
Possible Ore - Under 937X - Vein	800	.45
<u>1100 Sub-Level</u>		
Possible Ore - Block 1400-1500	750	.40
<u>1100 Level</u>		
Possible Ore - Under 1112-3 Drift	1,400	0.5
" " " 1114 "	800	0.4
" " " 1115 "	1,100	0.5
" " " 1119 "	1,100	0.5
<u>1300 Level</u>		
Possible Ore - 1302 Drift	6,000	0.4
<u>1500 Level</u>		
Possible Ore - Under 1302 Drift	<u>1,100</u>	<u>0.35</u>
<u>TOTAL ORE - PUGSLEY MINE</u>	<u>13,050</u>	<u>0.44</u>
<u>SURF MINE</u>		
Shaft Pillar - 900 Level	800	0.3
Below 967 Stope	<u>3,000</u>	<u>0.5</u>
<u>TOTAL ORE - SURF MINE</u>	<u>3,800</u>	<u>0.46</u>
<u>GRAND TOTAL</u>	<u>16,850</u>	<u>0.44</u>

In a letter to Mr. P.H. McCloskey, President of Matchewan, from A. McLeod, formerly mine superintendent of Surf Inlet Consolidated Gold Mines Limited, dated March 14, 1961, an estimate of ore reserves as furnished by Mr. A.J. Ingraham, formerly mine engineer and geologist at the Surf Inlet Consolidated Gold Mines Limited for the period 1936 to 1947, gives the following reserves based on reports as of April 1946:

TABLE 3

ORE RESERVES 1946

Pugsley Mine - East Vein

Gold

1000 foot Level

Probable Ore - Under 937 X-Vein	1500 Tons @ .46 oz.
Possible Ore - Under 934 S. Drift	800 Tons @ .42 oz.
Possible Ore - Block 1100-1200	500 Tons @ .40 oz.
(1088 Raise)	<u>2800 Tons @ .44 oz.</u>

1100 Sub-Level

Possible Ore - Block 1400-1550	750 Tons @ .40 oz.
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1100 Level

Possible Ore - Under 1109 X-Cut	700 Tons @ .50 oz.
Probable Ore - Under 111B & 111C Stopes	1,500 Tons @ .50 oz.
Probable Ore - Under 1114 N. Drift	500 Tons @ .40 oz.
Probable Ore - Under 1112 S. Drift	<u>1,000 Tons @ .50 oz.</u>
	3,700 Tons @ .49 oz.

East Vein Total 7,250 Tons @ .46 oz.

WEST VEIN

1000 Level

Possible Ore - Block 1460-1575	700 Tons @ .31 oz.
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1100 Level

Possible Ore - Block 730-805	<u>1,000 Tons @ .30 oz.</u>
West Vein Total	1,700 Tons @ 0.30 oz.

Combined Total 8,950 Tons @ .43 oz.

EAST VEIN

Hanging Wall possibilities Block 1250-1600	<u>5,000</u> Tons
TOTAL ESTIMATE	13,950 Tons
Based on 33% of work and adjoining Production	
900-1000 Level 600 N. to 800 N. (100'x 200')	3,300 Tons
1000-1300 Level 600 N. to 1000 N. (300' x 400')	<u>20,000</u> Tons
Partially tested South Area	23,300 Tons
Partially tested North Area	
900-1000 Level 1000 to 2000 (150 x 400)	10,000 Tons
Carried forward from above	<u>13,950</u> Tons
TOTAL	47,250 Tons

DUMP MATERIAL

Low grade stockpiles and waste dumps were created outside the 550 level of the Surf Mine where the coarse ore bins were located. Ore from the upper levels of the Surf Mine were conveyed by means of an aerial tramway 400 feet in length to the Mill. From the Pugsley Mine, ore is hauled from the mine bins to the Mill in three ton cars by electric trolley locomotives as far as the foot of the Mill incline. The cars were then hauled-up the incline by cable a distance of 800 feet where they were dumped in the coarse ore bins above the Mill.

In 1981, a preliminary sampling program was conducted in order to obtain a general overall grade. Freese and Juras (1981) report:

"Approximately 400,000 tons of this material is located around the 550 level adit, Surf mine, and was used as the foundation for the tramway to Bear Lake. The 550 level adit area dumps can be broken down into the West dump, East dump and North dump (Plate 81-22). The West dump is the largest and contains the greatest percentage of bull quartz (Pugsley material). The East and North dumps consist mainly of gneiss and altered diorite (Surf Material) though concentrations of quartz are found locally. Sampling of the West dump was conducted along a 110 meter long line at 6 meter intervals. The East dump was sampled along a 42 meter long line at 6 meter intervals. The North dump was not sampled. The resultant gold values are quite varied. The West dump has an average cut value equal to 0.069 oz Au/T and the East dump has an average cut value equal to 0.033 oz Au/T. Both dumps combined give an average value of 0.059 oz Au/T."

Additional sampling of these dumps will be necessary to calculate a true grade. A test program is proposed to investigate the feasibility of biological leaching to enhance gold recoveries on this dump material.

The tramway roadbed between the Pugsley 900 level and the Mill was sampled in 1981 along a 30 meter interval across the Paradise Creek cut at 3 meter intervals. This section had varied values which gave a cut average of 0.053 oz/ton Au (Freeze and Juras 1981). The tonnage available from the tramway roadbed has not been estimated by previous workers.

The location of the final tailings, which would include over one million tons of material grading between 0.034 and 0.051 oz/ton gold (assuming mill recoveries between 88% and 92%) is not mentioned by available reports. "Beach sand" from the mouth of Paradise Creek assayed 1020 ppb Au and may represent parts of the tailings disposal area.

EXPLORATION POTENTIAL

There is considerable potential to locate more ore in both the Pugsley and Surf mine areas. These can be summarized in order of importance as follows:

- (a) directly down dip from the lowest levels of the Pugsley Mine.
- (b) below the lowest level of the Surf Mine and to the north.
- (c) An area lying north of the Pugsley Mine and below 900 level. This area has been drilled in the past and yielded one ore intersection.
- (d) South of Pugsley Mine, investigated by drifting on 900 level which indicated lower grade zones.
- (e) Cassie Adit area which showed promising results from surface workings but no ore was found from limited drilling. Dump samples assayed up to 1.84 oz/ton Au. Located 2.5 km south of 900 portal.
- (f) Bonanza Claim, large thickness of altered zone, 2 mineralized quartz veins, located 1.5 km south of 900 portal.

The ore zones in the Pugsley Mine persist to the deepest levels and the ore is open at depth. At the Surf Mine the operating staff considered that the ore zone pitched toward the south and little concentrated exploration was done to trace a northerly pitch which Gill (1941) found to be the true overall trend.

North of the Pugsley Mine, diamond drilling was carried out in 1946 with inconclusive results. A small ore zone appears possible in this area. An exploration drift 3,500 feet long on 900 level investigated the shear system south of the main Pugsley ore zone. Some low values were found in the first part of this drift and should be defined in more detail (Gill 1941, Page 19).

Several surface showings are known south of the Pugsley Mine. The general structure along the shear system on the Cassie and Bonanza claims is very similar to that seen in the Pugsley and Surf Mines. The significance of these surface showings are that they give indication of mineralization over 2 km south and over 700 m above the Pugsley ore zone.

CONCLUSIONS

The Surf and Pugsley Mines were major producers of gold, silver and copper. In the Surf Mine, 930,000 tons of ore was mined over a vertical range of 1,400 feet equivalent to 660 tons per vertical foot. Vein widths range from 2 to 40 feet, averaging 10 feet. In the Pugsley Mine, productive vein systems averaged 4 feet. Approximately 170,000 tons of ore was mined over a vertical range of 700 feet equivalent to 240 tons per vertical foot.

To the end of 1942, total recorded production from the property amounted to 1,091,131 tons from which recoveries were 382,351 ounces of gold, 208,752 ounces of silver and 6,314,341 pounds of copper (Dolmage 1946).

There are over 400,000 tons of coarse dump material outside the 550 level Surf Mine which assay an average cut-grade of 0.059 oz/ton Au. An undetermined amount of coarse material forms the road bed of the tramway between the Pugsley 900 portal and mill incline which was sampled along one locality giving a cut average of 0.053 oz/ton Au. The location of final tailings which may grade between 0.034 and 0.051 oz/ton Au (assuming mill recoveries of 88-92% with head grades of 0.425 oz/ton Au) is unknown. Modern leaching methods have not been tested on any of this material.

Current reserves calculated after the mines closed down due to labour shortages and general wartime conditions are 13,900 tons proven plus inferred reserves of 47,000 tons above the 1,300 level at historical grades of 0.4 oz/ton gold.

Exploration potential is considered favourable to increase reserves from the down dip extension of the main Pugsley and Surf ore bodies. Other exploration targets are the region between the two ore zones and surface showings south of the Pugsley workings.

RECOMMENDATIONS

STAGE I

The dump material should be investigated by biological preoxidation leach tests to determine the feasibility of using a biological process to enhance gold recovery. Micro-biological leaching research studies on a wide range of pyritic ores have shown that biological preleach can liberate precious metals for recovery by standard cyanidation procedures.

The proposed experimental test program on the dump material will comprise the following steps:

- Sample preparation to provide finely ground material for bacterial adaptation tests, preoxidation leach tests, cyanidation tests and assays.
- Adaptation of a selected bacterial culture to growth on the ore using standard procedures.
- Two biological preoxidation leach tests to achieve a low and high degree of sulphide oxidation.
- Cyanidation tests on untreated head and bioleach residues to determine gold (and silver) recoveries.
- Assays (solution, solids, fire assays) as required for calculation of material balances and extractions.

In conjunction with the bio-leach testing, a preliminary study should be made on the suitability of designing a portable, modular milling facility for the Surf Inlet property.

All available data on the 1946-1947 drilling and drifting program should be reviewed in detail and compiled on a new set of plans and sections at a scale of 1:500 or 1" = 40 feet. An effort should be made to determine if the 1946-1947 drill core was saved.

STAGE II

The down-dip extensions of the Pugsley or zone can be tested in a preliminary manner by surface diamond drill sites located on the bench west of the Marcia and Bluebell claim. The Pugsley 900 level should be cleared for access to the south exploration drift. The reported low grade zones in the south drift can then be more closely defined.

A surface drill program is also recommended to investigate the area around the showings on the Cassie and Bonanza claims.

STAGE III

Contingent on the above programs, the Pugsley workings should be pumped out and underground exploration be undertaken to prove up additional ore reserves.

Respectfully submitted,

J.T. Shearer, M.Sc, FGAC

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A P P E N D I X 1

STATEMENT OF QUALIFICATIONS

J.T. SHEARER, M.Sc., F.G.A.C.

STATEMENT OF QUALIFICATIONS

I, John T. Shearer of the City of Port Coquitlam, in the Province of British Columbia, do hereby certify:

1. I graduated in Honours Geology (B.Sc. 1973) from the University of British Columbia and the University of London, Imperial College, (M.Sc. 1977).
2. I have practised by profession as an Exploration Geologist continuously since graduation and have been employed by such mining companies as McIntyre Mines Ltd., J.C. Stephen Explorations Ltd. and Carolin Mines Ltd. I am presently employed by TRM Engineering Ltd.
3. I am a fellow of the Geological Association of Canada. I am also a member of the Canadian Institute of Mining and Metallurgy, the Geological Society of London and the Mineralogical Association of Canada.
4. I have no interest in M/C or Matachewan Consolidated Mines Ltd., nor do I expect to receive any in the future. I consent to the use of this report in or in connection with the prospectus or in a Statement of Material Facts relating to the raising of funds for this project.
5. I have visited the property on June 8, 1985, and examined diamond drill core and underground workings. I have also reviewed reports and other documents relating to the property.

Dated at Vancouver, British Columbia

J.T. Shearer, M.Sc., F.G.A.C.

June 25, 1985